MAY 1, 1961
Volume 50, No. 9

Contents—Page 7

OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN DYESTUFF REPORTER

TEXTILE WET-PROCESSING

Enhance the hand of quality . . .

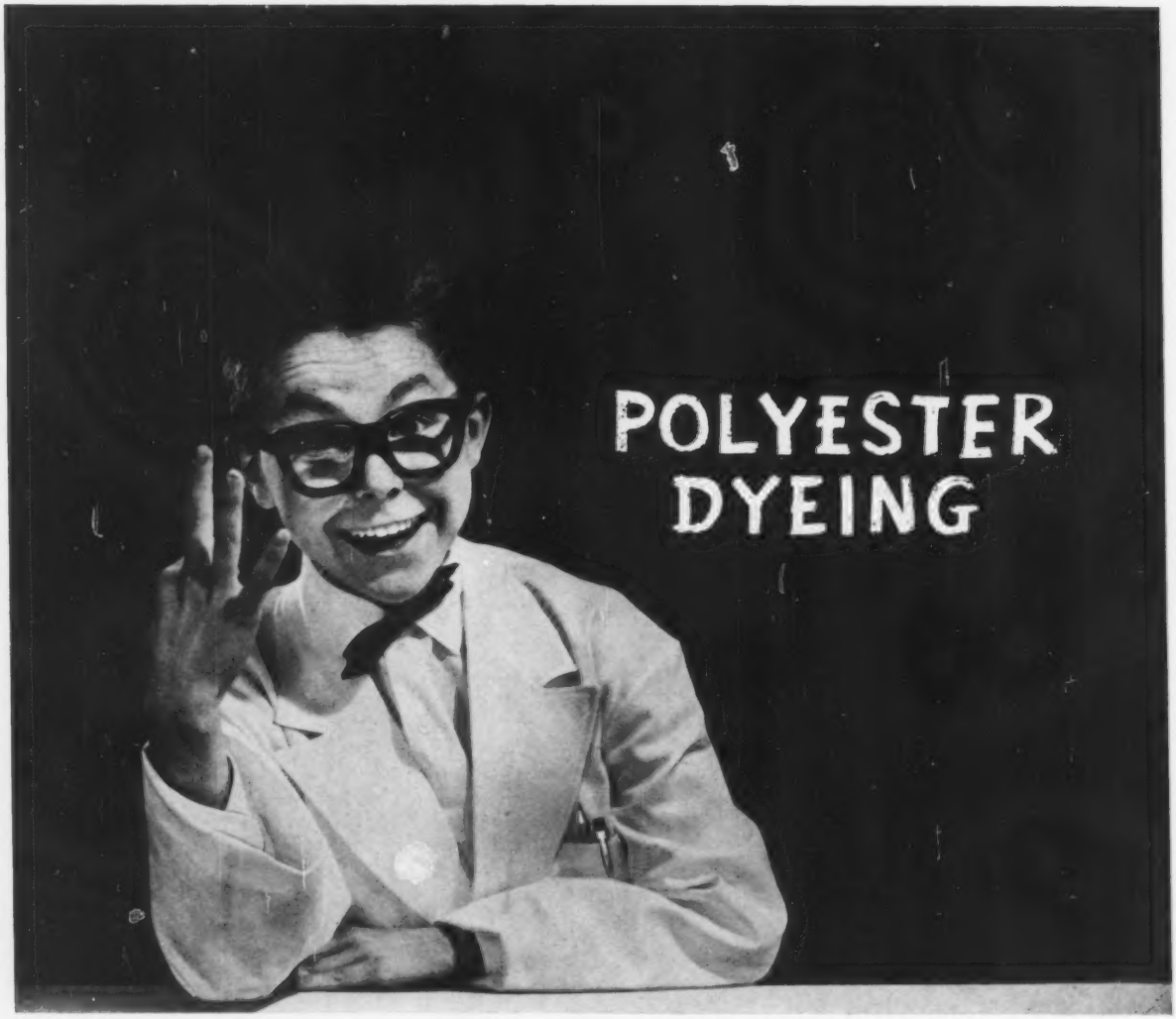
A full, rich hand distinguishes the magic wrought by WICASET WA-89. Running ease and cleaner cans are yours, while WICASET WA-89 bulks the goods without stiffening. Erase the nightmare of thin-and-flat. Wake up to blown up yardage with added tear strength, crease resistance and abrasion resistance. Customer quote: "An amazing product . . . I wish I'd known about it long ago."

Wica

SPECTRUM ACCURACY

WICA CHEMICALS, INCORPORATED
OLD CONCORD ROAD • CHARLOTTE, NORTH CAROLINA

HOWES PUBLICATION



Simple as 1 2 3 with carolid®

1 Add carrier at 120° F. 2 Add dye within 5 minutes. 3 Bring to dyeing temperature.

carolid gives you spot-free, level dyeings on the beck, jig, or any other equipment. It saves time, gives up to 25% greater color yields, and its lasting action allows many dyestuff adds. Take the simple solution to your polyester dyeing problem: try non-toxic **carolid** yourself and see.

CHEMICALS FOR DIFFICULT PROCESSING

TANALID® PROCESS FOR POLYESTER PRINTING.
TANALON® SPECIAL FOR POLYESTER STRIPPING.
TANAPAL ME WHERE DISPERSE DYES PRESENT LEVELING PROBLEMS.
TANAPON X-70 REMOVES MORE FATTY EXTRACTABLES FROM KNIT GOODS THAN SOLVENT SCOURS.

TANATEX

For details write, wire, phone:

TANATEX
CHEMICAL CORPORATION
BELLEVILLE TURNPIKE, KEARNY, NEW JERSEY • WYMAN 8-0732

ALSO: TANATEX CHEMICAL (HOLLAND) N.V./DER KINDERENLAAN 3/LAREN N.H., HOLLAND

Koppers dyes are right for every fiber

Quality color in modern living is of utmost importance. To achieve consumer-pleasing shades of vibrant, long-lasting color—regardless of individual fiber characteristics—count on dependable Koppers dyes.

From a wide range, you can select the quality dye that will meet the most stringent requirements. Through intensified research programs, Koppers dyes have attained excellent processing characteristics for good build-up, even exhaustion and outstanding leveling properties.

Whatever your dyeing problem, contact your Koppers representative. Our technical service and laboratory facilities are always available. VMA 6408

KOPPERS COMPANY, INC. *CHEMICALS AND DYESTUFFS DIVISION*

Pittsburgh 19, Pennsylvania

(FORMERLY AMERICAN ANILINE PRODUCTS) PLANT: Lock Haven, Pa.

BRANCHES: Providence, R. I. • Philadelphia, Pa. • Paterson, N. J. • Chicago, Ill. • Charlotte, N. C. • Chattanooga, Tenn. Columbus, Ga. • Los Angeles, Calif.

IN CANADA: Dominion Anilines & Chemicals, Ltd., Toronto, Canada • Montreal, Canada

Two new solutions to the profit squeeze—carboxylic PLIOLITE Latices

You save 3 ways with new PLIOLITE Latices 440 and 460. First, each is unusually versatile—can be used in several applications for sizable savings in purchasing and handling. Second, each accepts high pigment loading for more economical compounds. Third, each is easy to process for extra operational savings.

Outstanding adhesion and resistance to aging are other important advantages of these new carboxylic modified latices. They also exhibit excellent film strength, high mechanical and chemical stability and good ultraviolet resistance.

It will pay you to investigate the new PLIOLITE Latices, whether you use latex in carpet backing, scrim adhesives, upholstery backings, nonwoven fabric binders or printing inks. For maximum resistance to solvents and yellowing, look also to the new carboxylic nitrile latex – CHEMIGUM 520. Samples and technical data are yours by writing Goodyear, Chemical Division, Dept. E-9410, Akron 16, Ohio.

Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Pliolite, Chemigum—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

American Dyestuff Reporter Vol. 50, No. 9, May 1, 1961. Published every other Monday. Printed at Easton, Pennsylvania. Copyright 1961 by Howes Publishing Co., Inc., 44 E. 23rd St., New York 10, N.Y. Domestic subscription $7.50; Canadian $8.50; Foreign $18.00. Second Class Postage paid at Easton, Pa.

Reactone®

Geigy

a new advance in printing and dyeing

Geigy Dyestuffs
Saw Mill River Road, Ardsley, NewYork

The new reactive dyes in printing and padding

Latest additions:
Reactone Yellow 2R
Reactone Bordeaux BL
Reactone Navy Blue 2RL

Reactone dyes give prints and dyed shades of outstanding brilliance.
Reactone dyes are intermiscible and can be used to produce a very wide range of shades.
Reactone dyes form a chemical linkage with cellulosic fibres and thus ensure outstanding wet fastness.
Reactone dyes have exceptionally good stability. Alkaline print pastes and pad liquors remain stable for several weeks without loss of strength.
Reactone dyes have no affinity for the fibre in the absence of electrolytes; consequently washing off of hydrolysed dyestuff presents no difficulty.
Reactone dyeings and prints are not hydrolysed by acid atmosphere or acid finishes.

Uses
Printing:
screen and roller printing
Dyeing:
heat fixation, one-bath/steam, cold pad batch and pad-jig processes

®Reactone Geigy

Geigy Dyestuffs
Saw Mill River Road, Ardsley, New York

ESTABLISHED
1917

Including since 1921, the official Proceedings of the American Association of Textile Chemists and Colorists

AMERICAN DYESTUFF REPORTER

TEXTILE WET PROCESSING EXCLUSIVELY

NORMAN A JOHNSON
Editor

CHARLES A WHITEHEAD
Managing Editor

MYRON D REESER
Business Manager

HERBERT A STAUDERMAN
Advertising Manager

WILLIAM J O'CONNOR
Production Manager

BERYL A LAKNER
Circulation Manager

OFFICIAL
PUBLICATION
OF THE
PROCEEDINGS
AMERICAN
ASSOCIATION
OF
TEXTILE
CHEMISTS
AND
COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist was incorporated with it in January, 1949. Published every other Monday, by the HOWES PUBLISHING COMPANY, INC, 44 East 23rd Street, New York 10, NY. C R Howes, president; Ernest J Finan, executive vice president; Norman A Johnson, vice president & treasurer; Myron D Reeser, vice president; Clara Patrick, secretary.

Telephone SPring 7-9364

VOLUME 50 May 1, 1961 NUMBER 9

specially contributed

The Swelling Action of Carriers in Dyeing Polyethylene Terephthalate Fiber 23 (P320)
F M Rawicz, D M Cates and Henry A Rutherford

aatcc proceedings

Identification of Antibacterial and Mildewproof Finishes 30 (P325)
T D Miles
Analysis of Film-forming Finishes in Textiles 34 (P329)
Braham Norwick
Recent Developments in the Dyeing of Verel Modacrylic Fiber 41 (P336)
R J Fortune
New Fibers from Du Pont 45 (P340)
M M Christie
AATCC Calendar 33 (P328)
Employment Register 40 (P335)
Membership Applications 49 (P344)
Future Papers 49 (P344)
Activities of the Local Sections 50 (P345)

departments

Open Forum:
Aren't We the Funny Ones? 9 (319)
ADR News Report 55 (348)
Technical Literature 59 (350)
Personalities in the News 63 (352)

Copyright, 1961, Howes Publishing Co, Inc
Contents of previous issues can be found by consulting the Service and Technology Index and the Engineering Index, at your library

NEW Dispersol CWL

For Improved Level Dyeing of Wool

The finest level dyeing assistant available!

Reduces the rate of dyeing and results in a marked improvement in the level dyeing properties of acid milling dyes.

Dyeing can safely be commenced at higher temperatures, thus reducing the overall dyeing time.

Enables acid milling dyes to be applied under acid conditions.

Improves compatibility of acid milling dyes, allowing dye combinations previously considered unsuitable.

No reduction in fastness properties.

Send for application data and sample.

Quality AHCO PRODUCTS Integrity

ARNOLD, HOFFMAN & CO. INCORPORATED

55 Canal Street, Providence, Rhode Island • Est. 1815
A Subsidiary of Imperial Chemical Industries Limited, England
West Coast Representative: Chemical Manufacturing Company, Incorporated of California

ICI

Dispersol — Registered trade mark

94-1

"AREN'T WE THE FUNNY ONES?"

IN a recent mailing to its customers the Du Pont Company presented its version of the tariff story in a folder of cartoons under the title "Aren't We the Funny Ones?". Even without the cartoons the story is clear enough from the captions:

—During the first thirty years of this century we worked hard and learned how to make more and more with less and less labor.

—Our standard of living grew by leaps and bounds as rate of productivity increased.

—In addition we had relatively high tariff protection.

—During the world depression of the early thirties we reduced tariffs to try to improve world trade.

—Then came World War II.

—After the war we spent billions of tax dollars building modern plants for former allies and enemies.

—We taught them how to run these factories and sell their products even in the US. We Are Funny.

—In addition, we reduced tariffs until today they average only 5%. We *really* are funny.

—Foreign wages are only a fraction of ours and living standards are correspondingly lower.

—Foreign countries with new machines but low wages can undersell us not only in world markets but in this country.

—Many plants have had to close and people were forced out of their jobs.

—Imports of apparel alone in 1959 represent 97 U S factories each employing 250 people.

—In addition, it has been determined that for every manufacturing job there are 2.6 people furnishing services.

—We certainly can't help others if our own industrial system is being weakened.

—We are a big hearted lot. So-o-o—o Where are we?

—Caught in a squeeze.

—What can we do? Sit in the corner and weep? No!

—Lower our wages and living standards? No!

—Increase our efficiency? We have reached a point where this is difficult to do.

OR

—Fight for our very existence by shouting from the housetop

—to . . . The American Consumer

—and to our legislators

Obviously this is an oversimplification of a very complex subject that requires serious consideration on the part of every American. It is hoped that the distribution of this booklet will stimulate such consideration. We shall be pleased to have you send us your views, but at least send them to your representatives in Congress.

To BE rIGHT Takes MONeY

And in this business *we want to be right* . . . right in terms of supplying you with the highest quality ARIDYE and AQUAPRINT Pigment Colors and INTERCHEM Dyes. They are noted for producing prints and plain shades that meet the most-stringent requirements with their brilliance of shade, sharp marks, fine lines, smooth blotches . . . and excellent all-round fastness.

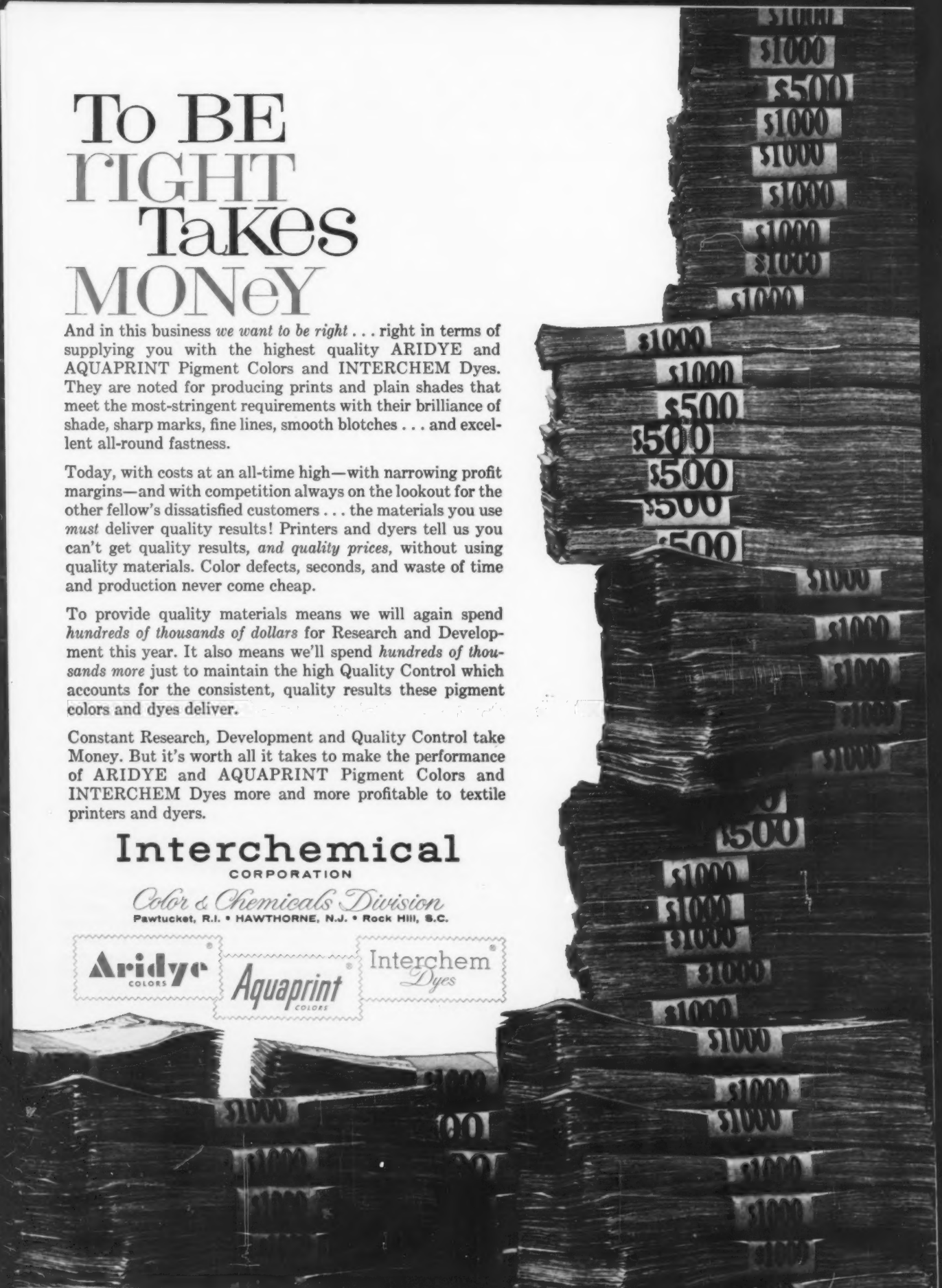
Today, with costs at an all-time high—with narrowing profit margins—and with competition always on the lookout for the other fellow's dissatisfied customers . . . the materials you use *must* deliver quality results! Printers and dyers tell us you can't get quality results, *and quality prices*, without using quality materials. Color defects, seconds, and waste of time and production never come cheap.

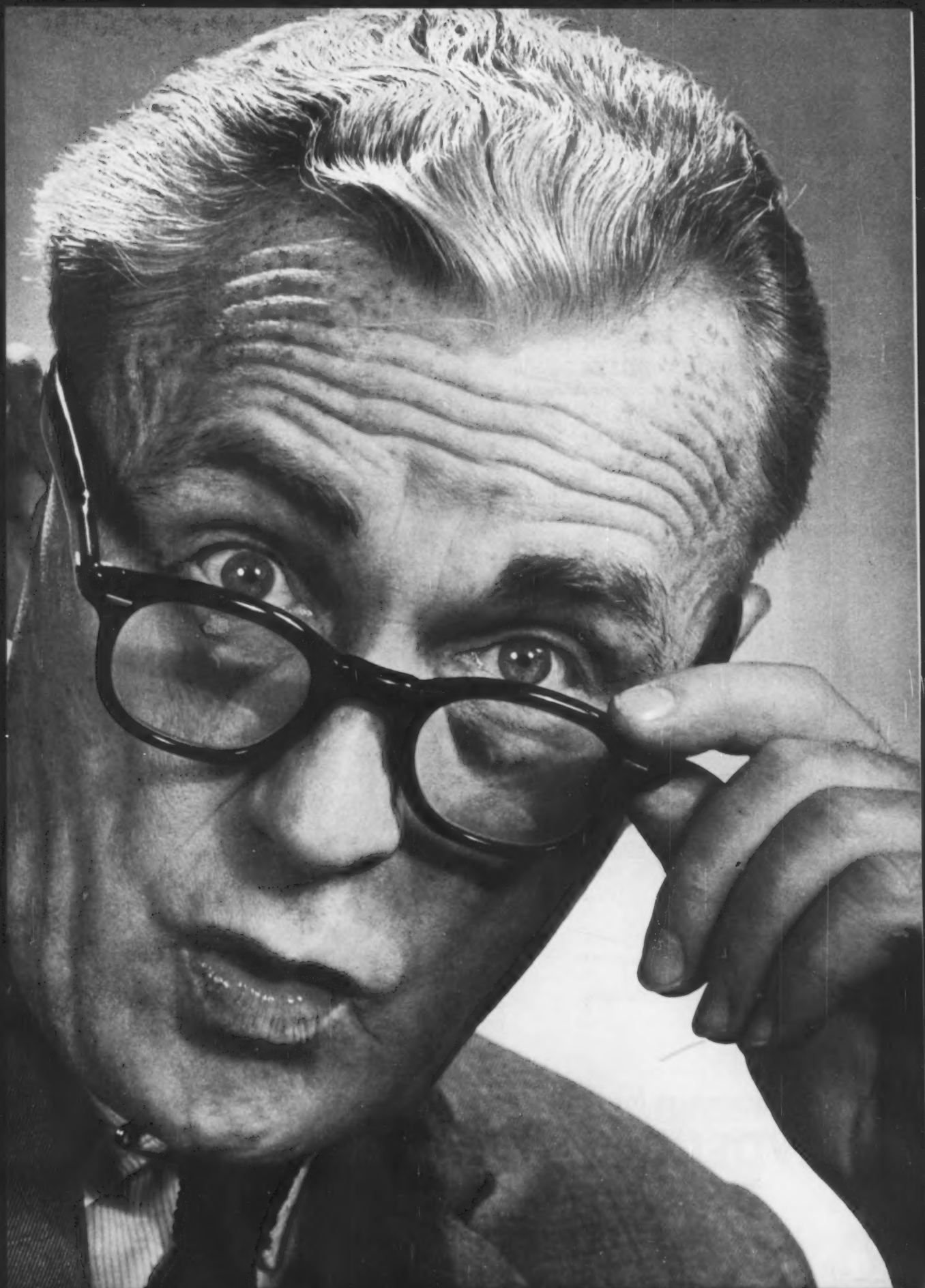
To provide quality materials means we will again spend *hundreds of thousands of dollars* for Research and Development this year. It also means we'll spend *hundreds of thousands more* just to maintain the high Quality Control which accounts for the consistent, quality results these pigment colors and dyes deliver.

Constant Research, Development and Quality Control take Money. But it's worth all it takes to make the performance of ARIDYE and AQUAPRINT Pigment Colors and INTERCHEM Dyes more and more profitable to textile printers and dyers.

Interchemical
CORPORATION
Color & Chemicals Division
Pawtucket, R.I. • HAWTHORNE, N.J. • Rock Hill, S.C.

Aridye® COLORS
Aquaprint® COLORS
Interchem® Dyes





BLEACHING

SEYCO-BRITE K is truly compatible with caustic solutions; drives the liquors into the goods and cleans dirt out. Thorough penetration of fibers results in a fine, white absorbent bottom. The explosion and removal of leaf and seed particles are actually better than ever!

SEYCO SEQUESTRANTS are very effective in kiering and bleaching as well as in the dye bath. Rust stains are completely prevented. Soap or detergent scum due to hard water or to calcium from cotton ash is eliminated.

SEYCO SEQUESTRANT FA CONC. (new) when used in alkaline or caustic bath actually removes rust particles from grey goods—thus eliminating pin holes in subsequent peroxide bleaching.

Warp Sizing: *Softeners, Binders, Penetrants, Ty-In Penetrants, Shuttle Dressing, Waxes.*

Niagara Twist-Setter: *Yarn Conditioning Penetrants.*

Seyco Warp Lubricator.

Wet Processing Chemicals and Auxiliaries: *Dye Assistants, Penetrants, Rewetting Agents, Sanforized Fabric Oils, Detergents, Scouring Agents, Softeners*

Customer Service Phone
(Direct Line)
TRinity 6-1797

Headquarters for textile chemicals

SEYDEL-WOOLLEY & CO.

748 RICE STREET, ATLANTA, GEORGIA

Fill your surfactant needs

from CARBIDE'S 9 TERGITOL nonionics

Take your choice from CARBIDE'S TERGITOL nonionics—one that is completely soluble in oil . . . another that dissolves in water at high temperatures . . . or one with a combination of characteristics. TERGITOL nonionics have outstanding capacity to emulsify oils, waxes, and greasy soils—to hold them in suspension. As wetting agents, TERGITOL nonionics are noted for their chemical stability in the presence of acids and salts. They are not affected by hard water or alkalies.

TERGITOL nonionics have proved effective in scouring, bleaching, and carbonizing compounds used by the textile industry. As detergents, they speed dishwashing, laundering, dry cleaning. They give good pigment dispersion, flow-out, and stability to latex paints. Metal cleaners, leather dressings, silicone preparations, shampoos, adhesives, bactericides—all can be improved with TERGITOL nonionics.

Cloud Points of 0.5% aqueous TERGITOL Nonionic Solutions (Degrees C.)

NP-14	Insoluble
NP-27	20
TP-9	51-56
NPX	60-65
NP-35	90-95
NP-40	100
TMN	35-37
XD	60-65
XH	90-100

You can obtain TERGITOL nonionics in 55-gal. drums, combination car load or truck load lots, or compartment tank car shipments. Your CARBIDE Technical Representative can help you solve your surfactant problems. Or write Dept. HC, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

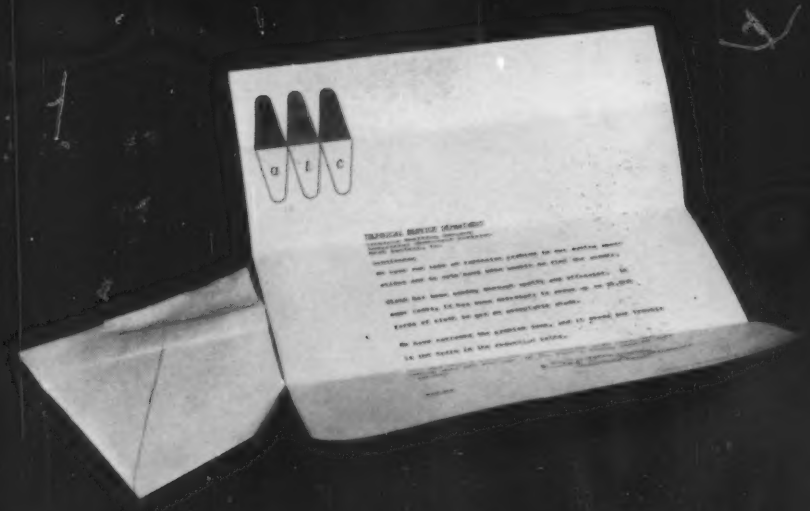
TERGITOL and UNION CARBIDE are registered trade marks.

UNION CARBIDE CHEMICALS COMPANY

UNION CARBIDE

Another example of "Virginia" nationwide technical service

"We have run into an expensive problem...
cloth has been coming through spotty...
our trouble...is in the reduction baths...
send a technical representative..."



Armed with a Redox Recorder, a "Virginia" technical representative was sent to the ailing dyehouse. The reduction bath was tested for potential every ½ hr. around the clock. Our troubleshooter found the defect to be in the method, not the material—the sodium hydrosulfite (a competitor's) was being agitated too strongly in the bath, with rapid decomposition of the hydro. New baths were prepared on the heels of the old ones. More degrading of the hydro. Final recommendation: Cut the amount of hydro used by 25% and save money. The dyehouse management was openly grateful for the know-how the "Virginia" rep had put to use. And immeasurably more so later, for it turned out that annual savings ran up into the thousands. If your company's problems involve a reducing agent, "Virginia" technical service will supply *you* with the same experienced, painstaking attention to details—and get results. For more information write the Industrial Division, VIRGINIA SMELTING COMPANY, Dept. 699, West Norfolk, Virginia.

VIRGINIA Chemicals ®

Field Offices: New York • Boston • Chicago • Atlanta
Asheville • Philadelphia • Akron • Seattle • Memphis

Available in Canada and many other countries

HILTON DAVIS

quality pigment
printing colors
impart elegance
to your fabrics

HILTONE® *water-in-oil*

SEABOND® *oil-in-water*

SKYTONE® *pigment padding*

each
offers
these extras

- **fastness to washing**
- **fastness to dry cleaning**
- **fastness to crocking**
- **compatible with drip dry finishes**
- **gives brilliant shades**
- **most economical**

THE HILTON-DAVIS CHEMICAL CO., DIV.

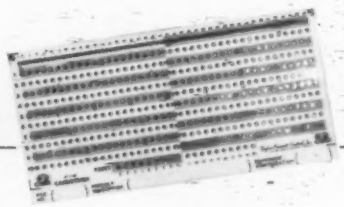
Sales Offices, Laboratories and Warehouses at Greenville, S.C.
Providence, R.I. • Newark N.J.

CINCINNATI 13, OHIO

PRODUCERS OF DYESTUFFS AND PIGMENTS

With this *Taylor* CARD-O-TIMER® Batch Process Controller you just load and unload...

the rest is automatic!

THIS CARD  IS THE SECRET

Just punch the card for any batch process cycle and you can repeat it exactly at any time in the future, simply by inserting that card in the CARD-O-TIMER Controller. Brain of a fully automatic control system, the CARD-O-TIMER Controller eliminates the hazards of human error.

Many batch processes in the textile industry can be fully automated with the Taylor CARD-O-TIMER Controller.

Ask your Taylor Field Engineer for full details, or write for **Bulletin 98357A.** Taylor Instrument Companies, Rochester, N.Y., and Toronto, Ontario.

- **Insures positive repeatability**
- **Saves repeated trial and error settings**
- **Permits flexibility in changing cycles**
- **Saves operator time**

Taylor Instruments **MEAN ACCURACY FIRST**

BLANCOPHOR optical brighteners bring you in "on target" as to results. The reliability of these products and the wide range in which they are offered allow you to meet just about every specification of substantivity, solubility, and hue of fluorescence. Consult the chart below to select the Blancophor products that are most promising for your purposes. Then check the coupon and forward it to General Dyestuff Company for prompt service on samples and literature.

For bright whites and sparkling pastels.

BLANCOPHOR® BRIGHTENERS

BLANCOPHOR PRODUCT	SUBSTANTIVITY		SOLUBILITY IN WATER (unless otherwise indicated)	DAYLIGHT HUE greenest hue = 1 pinkest hue = 5	DYEING TEMPERATURE (pH 7)	EXHAUST RATE	LEVELING
	cotton rayon other cellulosics	nylon wool acetate rayon acrylics					
AW (powder)		+	1% in H_2SO_4	5	130°F*	Fast	Good
CB-32 (liquid)	+		15%	1	70-130°F	Moderate	Excellent
FFG (powder)		+	1%	5	130°F*	Fast	Good
GS-33 (liquid)	+		15%	3	70-130°F	Moderate to Fast	Very Good
HS-31 (liquid)	+		15%	4	70-130°F	Moderate	Excellent
HS-71 (powder)	+		15%	4	70-130°F	Moderate	Excellent
MS-31 (liquid)	+		10%	2	70-130°F	Fast	Good
MS-72 (powder)	+		10%	2	70-130°F	Fast	Good

*Acrylics require a dyeing temperature of 180-200°F.

gdc gaf

FROM RESEARCH TO REALITY

GENERAL DYESTUFF COMPANY
A DIVISION OF
GENERAL ANILINE & FILM CORPORATION
435 HUDSON STREET • NEW YORK 14, NEW YORK

SALES OFFICES: Charlotte • Chattanooga • Chicago • Los Angeles • New York
Philadelphia • Portland, Ore. • Providence • San Francisco
IN CANADA: Chemical Developments of Canada Ltd., Montreal

GENERAL DYESTUFF COMPANY
435 Hudson Street, New York 14, N. Y.

Gentlemen:

Please send me samples of the Blancophor products checked and pertinent literature.

☐ AW ☐ FFG ☐ HS-31 ☐ MS-31
☐ CB-32 ☐ GS-33 ☐ HS-71 ☐ MS-72

NAME_____

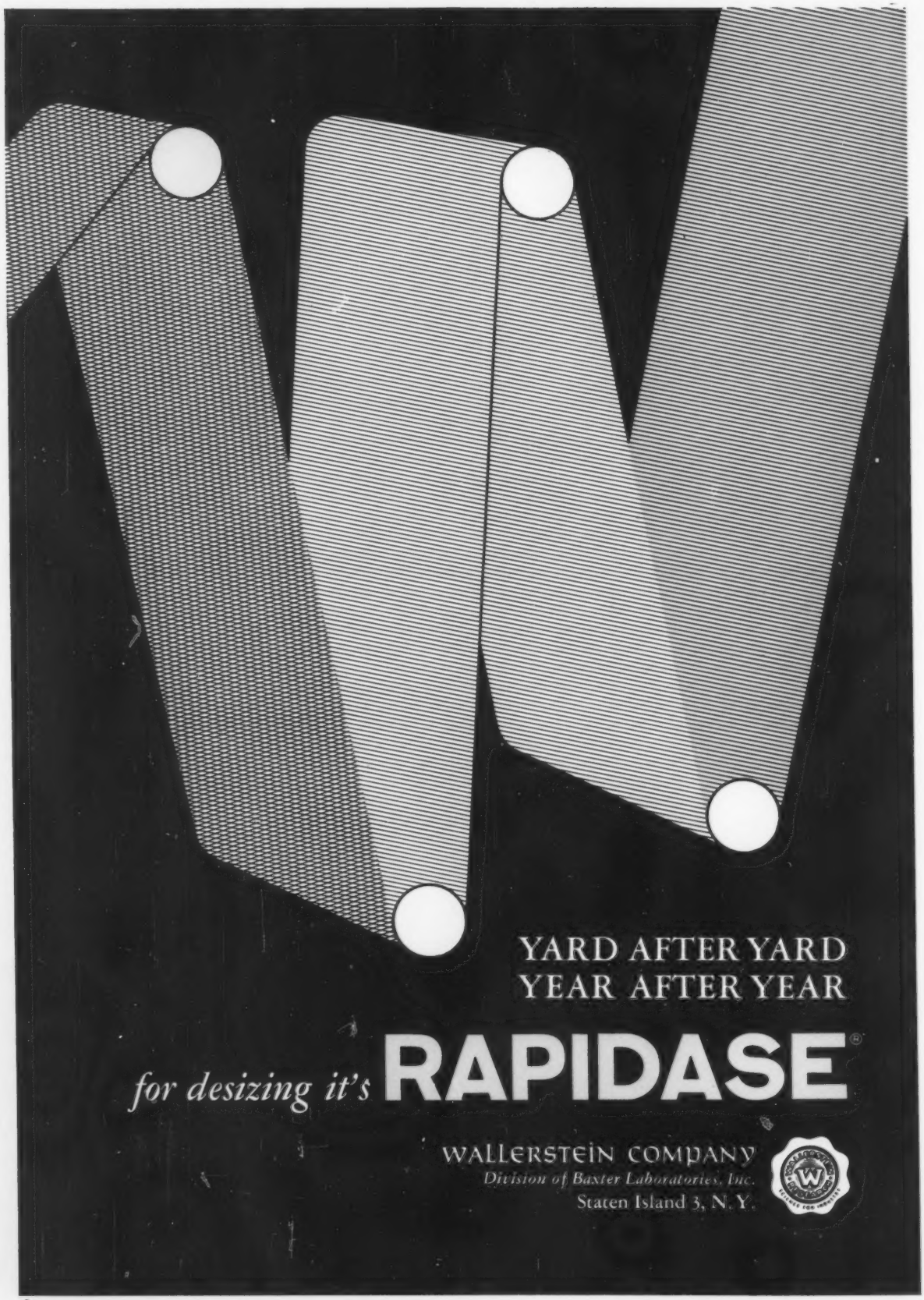
TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Blancophor brighteners manufactured by General Aniline & Film Corporation are sold outside the United States, by distributors all over the world, under the trademark "Tintofen.®"


YARD AFTER YARD
YEAR AFTER YEAR
for desizing it's RAPIDASE®
WALLERSTEIN COMPANY
Division of Baxter Laboratories, Inc.
Staten Island 3, N. Y.

SEND YOUR DARK SHADES TO MARKET PROTECTED BY THE OUTSTANDING FASTNESS OF EASTMAN POLYESTER DYES

Call in your Eastman representative to tell you all about the performance advantages and economy of these dyes

Darker shades of polyester fabrics and their blends are more in demand than ever.

In step with this trend, Eastman offers an expanding series of polyester dyes, providing the best all 'round fastness characteristics of polyester dyes currently available.

Specifically developed for use with polyester fibers, these dyes exhibit outstanding fastness to washing, light, sublimation, crocking, perspiration, dry cleaning and wet pressing.

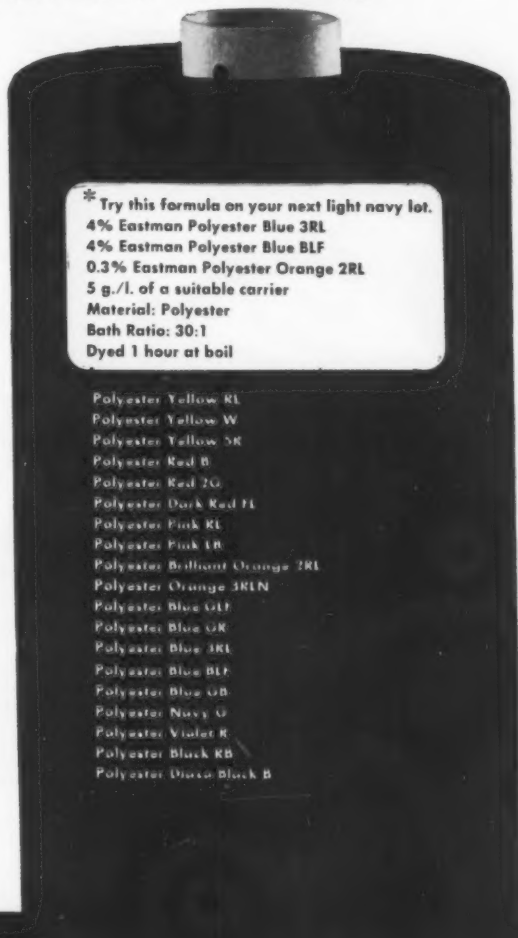
Equally important are their excellent processing characteristics...good build-up, good exhaustion and outstanding leveling properties. Thus, darker shades of navy, brown and grey are economically obtained.

Dyeing with Eastman Polyester Dyes is easily accomplished with carriers or under pressure at elevated temperatures. Fibers can be readily dyed in tow, tops, stock, or fabric forms. Fabrics of polyester filament can be conveniently dyed in jigs. Fabrics woven of spun polyester yarns alone or blended with cotton, viscose or wool can be easily dyed in dye-becks.

Get the full story of this outstanding line of dyes for polyester fabrics from your Eastman representative.

Eastman Polyester Dyes

Eastman Polyester Dyes are sold in the United States by EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of EASTMAN KODAK COMPANY, in Kingsport, Tennessee; Lodi, New Jersey; and Greensboro, North Carolina. On the West Coast through WILSON & GEO. MEYER & COMPANY, San Francisco, Los Angeles, Portland, Seattle, Salt Lake City. In Canada through CLOUGH DYESTUFF CO., LTD., St. Laurent, P. Q.



*** Try this formula on your next light navy lot.**
4% Eastman Polyester Blue 3RL
4% Eastman Polyester Blue BLF
0.3% Eastman Polyester Orange 2RL
5 g./l. of a suitable carrier
Material: Polyester
Bath Ratio: 30:1
Dyed 1 hour at boil

Polyester Yellow RL
Polyester Yellow W
Polyester Yellow 5R
Polyester Red B
Polyester Red 2G
Polyester Dark Red FL
Polyester Pink RL
Polyester Pink LR
Polyester Brilliant Orange 2RL
Polyester Orange 3RLN
Polyester Blue GLF
Polyester Blue GR
Polyester Blue 3RL
Polyester Blue BLF
Polyester Blue GB
Polyester Navy G
Polyester Violet R
Polyester Black RB
Polyester Disperse Black B

GEAR YOUR FABRICS TO THESE BETTER FINISHES....

Fine hosiery and lingerie of man-made fibers, turn to DuraBeau® finishes for the magic that adds enchanting appeal!

HYSORB® ... a finish-additive that makes synthetic fabrics more *absorbent.*

Make it *wash-and-wearable!* POLYEEN FINISH ... soft and resilient to the touch.

Creamoyl® finishes *economically* add a high degree of desirable hand in practically all fabrics of all fibers and blends.

For better pile, better resiliency, better hand in Tufted Textiles, look into BROSCO-TEX.

Fabrics that are *kind to the touch* and are *comfortable to the skin* get the sale preference every time!

That's why Lanolized® finished fabrics, for underwear and outerwear, are fast becoming the most-wanted on retail counters, everywhere! (for the more appealing touch in wash-and-wear, it's "LANOLIZED-WW")

The *Schollerized®* process makes wool WASH-TUB washable! If it's made to size it will stay to size, for the life of the fabric!

Scholler

PIONEERS IN THE BETTER FINISHES THAT MAKE THE BETTER FABRICS...SINCE 1907

Manufacturers of Textile Finishes, Resins, Softeners, Detergents, Soaps, Oils and Specialties

SCHOLLER BROTHERS, Inc., Collins & Westmoreland Streets, Philadelphia 34, Pa. IN CANADA: Scholler Brothers, Ltd., St. Catherines, Ontario

KNITWEAR FASHIONS

GDC DYES FOR ACRYLICS

tailored to fit the requirements of fiber, fabric, and wearer

Free-knit or full-fashioned, shaggy or smooth, cardigan or pullover, sports or dress wear—sweaters at their colorful best are dyed with GDC dyes.

Acrilan,[1] Creslan,[2] Orlon,[3] Zefran[4]—whatever your acrylic fiber—there is a range of GDC dyes that are just right for creating fashion shades with eye appeal and highest fastness to light, washing, perspiration, and drycleaning.

Genacryl,® Celliton,® Supralan,® Palatine®—remember these names for acrylic-fiber dyeing, for good fiber affinity in a broad range of bright, well-penetrated, level and economical fashion shades dyed by simple methods.

For acrylic sweater fashions in color—ask GDC.

Acrylic fiber of: (1) Chemstrand Corporation, (2) American Cyanamid Company, (3) E. I. du Pont de Nemours & Co. (Inc.), (4) Dow Chemical Company.

For complete information, call our Technical Service Department nearest you or write to:

gdc gaf

FROM RESEARCH TO REALITY

GENERAL DYESTUFF COMPANY

A DIVISION OF

GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET • NEW YORK 14, NEW YORK

CHARLOTTE • CHATTANOOGA • CHICAGO • LOS ANGELES • NEW YORK • PHILADELPHIA • PORTLAND, ORE. • PROVIDENCE • SAN FRANCISCO

IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

CARS GIVE UPHOLSTERY FABRICS THEIR TOUGHEST TEST

B.F.Goodrich

This upholstery fabric is back coated with Hycar acrylic latex supplied by B.F.Goodrich Chemical Company.

An automobile is just about the toughest proving ground you can find for an upholstery fabric. That's why the hidden advantages of a back coating of Hycar acrylic latex means so much in creating better, more durable fabrics. Hycar anchors the weave: it won't distort, won't ravel, no matter how many times the fabric is rubbed, stretched, or flexed. Seams can't slip either.

A Hycar back coating also gives the fabric lasting flexibility—and isn't affected by heavy doses of sunlight, heat or cold. Especially easy to use, this latex doesn't require compounding, is stable and colorless. The properties that make it washfast and unaffected by dry cleaning solvents are built right in.

Here's another way Hycar helps improve a product, open new markets. For more facts, write Department PG-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

PRODUCTS FOR TEXTILE IMPROVEMENT

B.F.Goodrich Chemical

a division of The B.F.Goodrich Company

DEVOTED EXCLUSIVELY TO TEXTILE WET PROCESSING

ADR

Specially Contributed

Carriers which are effective dyeing assistants for polyethylene terephthalate fiber swell and plasticize the fiber. The rate of dye uptake by the fiber is increased, even after the carrier has been removed, although the effect is much smaller than that in the presence of carrier.

THE SWELLING ACTION OF CARRIERS IN DYEING POLYETHYLENE TEREPHTHALATE FIBER[1]

F M RAWICZ[2], D M CATES, and HENRY A RUTHERFORD

Department of Textile Chemistry
School of Textiles
North Carolina State College
Raleigh, North Carolina

INTRODUCTION

THE valuable physical properties of polyethylene terephthalate fiber, such as high crystallinity, limited swelling in water, and compactness, have caused difficulty in dyeing, at least at normal temperatures. One of the early solutions to the problem involves the use of dyeing assistants, commonly termed "carriers". It seems generally accepted now that the effectiveness of the assistant depends on *absorbed carrier* (*1*). Absorbed carrier apparently acts by reducing interchain forces, thereby raising the diffusion coefficient of the dye within the fiber (*2*).

One aspect which has been the subject of much speculation concerns the importance of the swelling of the fiber in promoting rate of dye uptake in carrier-dye systems. It is well-known that carriers cause swelling of the fiber. Salvin and co-workers (*1*) worked with a number of carriers and found that all of them swelled polyester fibers. Choquette (*3*) stated that monochlorobenzene, although an efficient carrier, did not swell Dacron fiber; it was found in this laboratory, however, that the contraction in length of the fiber in pure chlorobenzene is 50% greater relative to that in water. The authors are not aware of an efficient carrier that does not shrink polyester fiber.

It seems obvious that swelling contributes in some degree to an increase in dyeing rate, but it is not always easy to demonstrate this experimentally. Carlene [quoted by Waters (*4*)] tried ten different carriers, but failed to establish any clear relationship. Waters therefore concluded that the effectiveness of a compound cannot be solely due to its ability to swell the fiber. Even though the carrier primarily assists dyeing by "lubricating" the polymer molecules, it is reasonable to assume that the concomitant swelling will also contribute to a higher dyeing rate. It is possible that the variables of swelling and "lubrication" interact; ie, the two are interdependent, in which case a constant effect of swelling cannot be isolated. It is shown in this paper that the effect of carrier treatment persists in some degree after removal of the carrier, and increases the dyeing rate, presumably through swelling, although the increase is relatively small compared to that in presence of carrier.

A major purpose of this paper is to present some observations that have been made in this laboratory on swelling of the fiber as a factor in carrier dyeing. The shrinkage in length of the fiber has been taken as a measure of its swelling. The investigation was divided into the following phases: measurment of the swelling of polyethylene terephthalate filament when treated with different assistants at various concentrations; measurement of changes in physical properties (denier, tenacity, initial modulus, and elongation at break) that are brought about by the contraction of the filament; determination of the effect of certain swelling treatments on the rate of uptake of dye.

EXPERIMENTAL

MATERIALS———Commercial 70-denier, 34-filament, bright, zero-twist Dacron (polyethylene terephthalate) continuous filament yarn with a draw ratio of 3 was used as the substrate in this study. The dye, Latyl Violet 2R, was of commercial quality; it is a nonionic dye of the anthraquinone type, but the exact structure has not been published. The carrier compounds were of technical purity. o-Phenylphenol and sodium o-phenylphenate were both weighed as the tetrahydrate of the sodium salt; the quantities quoted in the paper refer to this weight.

DETERMINATION OF CONTRACTION———While swelling of a fiber may be properly considered to be the increase in its volume, measurement of volume changes is rather tedious. As an alternative in the present work, the contraction in length of the fiber was taken as a measure of swelling.

Measurement of the shrinkage in length of single strands of polyethylene terephthalate yarn under the

[1]Taken in part from a thesis submitted by F M Rawicz to the Department of Textile Chemistry, School of Textiles, North Carolina State College, in partial fulfillment of the requirements for the degree of Master of Science in Textile Chemistry. This work was done under a fellowship sponsored by the Celanese Corporation of America. Parts of this paper were presented to the Piedmont Section of the AATCC on April 26, 1958 in Durham, NC.

[2]Present address: Dow Chemical Co, James River Div, Textile Development Dept, Williamsburg, Va.

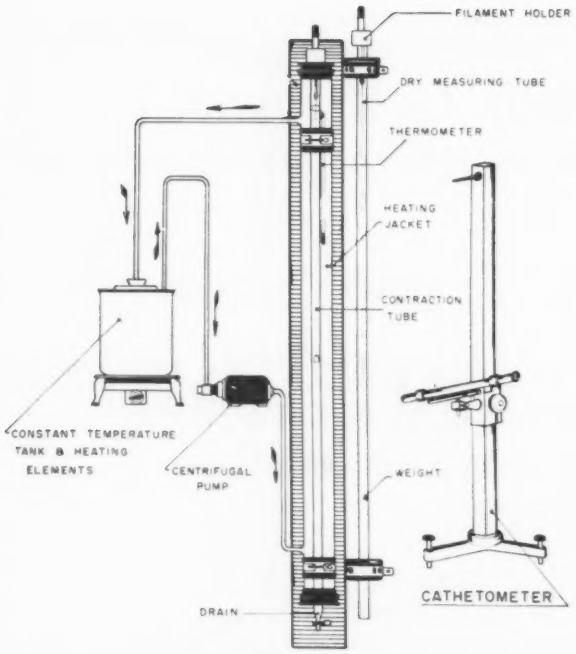


Figure 1
Contraction apparatus.

different conditions of treatment was carried out in the contraction apparatus shown in Figure 1. The temperature was kept constant to within ±0.5°C. A cathetometer was used to measure the length of the samples. All samples were measured in air at room temperature prior to treatment and then treated for 30 minutes under the desired conditions, after which the final lengths were measured. A 500-mg weight was suspended at the lower end of the test specimen to keep it straight.

The liquor ratio of the instrument was extremely high; the treatment column contained approximately 100 ml of solution and the weight of the sample (about 80 cm in length) was negligible.

The decrease in length is reported as percent contraction based upon the original length.

PREPARATION OF CARRIER SOLUTIONS AND EMULSIONS——Soluble carriers were used in the form of solutions. Insoluble carriers were used in finely dispersed form obtained by the following emulsification procedures:

o-Phenylphenol was emulsified by two different procedures; the difference did not affect the amount by which the polyethylene terephthalate filament contracted. In some experiments o-phenylphenol was regenerated from a solution of the sodium salt by adjusting the pH of the solution to 5.0 to 5.2 by the slow addition of acetic acid. In others, equal amounts of sodium o-phenylphenate and diammonium phosphate were dissolved separately in equal volumes of distilled water. The temperature of the solution of o-phenylphenate was raised to 80°C and the solution of diammonium phosphate was added slowly with vigorous stirring.

Emulsions of methyl salicylate and of methyl benzoate were prepared by mixing Triton X-400 (tetraalkylammonium halide), the desired carrier, and water in the ratio of 1:8:50 (by weight) in a Waring Blendor for 30 seconds. This mixture was then diluted to the desired volume.

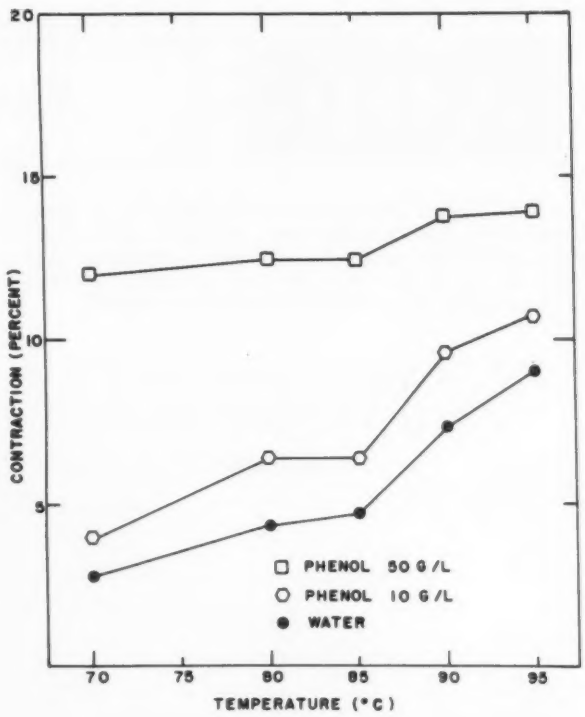


Figure 2
Effect of temperature on the contraction of polyethylene terephthalate filaments in presence of phenol.

The emulsion of tripropyl phosphate was prepared by slowly adding a mixture of one part of Emulphor ELA (ethylene oxide condensation product) in eight parts of the carrier to the desired amount of lukewarm distilled water, with stirring.

MEASUREMENT OF PHYSICAL PROPERTIES——Yarn treated with various solutions was rinsed in running water for 12 hours, dried at room temperature, and conditioned overnight at 65% RH and 21°C. Individual filaments were tested under standard conditions of 65% RH and 21°C. Denier was determined with an Insco Vibroscope. Filaments were elongated to break in an Instron tester using 10 in/min crosshead speed and 10-in gauge length. The properties of initial modulus, tenacity, and elongation at break were determined.

DYEING PROCEDURE——Dyeing was carried out at the boil in extraction flasks fitted with water-cooled reflux condensers. One-half gram of yarn, cut into pieces about one-inch long, was dyed in a bath of 100 ml containing three percent dye (on weight of fiber) and the desired amount of carrier.

Some of the fiber was dyed after pretreatment with one of several soluble and insoluble carriers. The fiber was first treated for 30 minutes at 95°C in a bath containing the carrier. The carrier was then extracted from the fiber either with acetone or methanol. The fibers were then dyed for one hour exactly as described above except that carrier was not included in the bath.

Exhaustion of the dye from the bath was estimated spectrophotometrically.

RESULTS AND DISCUSSION

CONTRACTION——The effect of temperature on the swelling of polyethylene terephthalate filament in

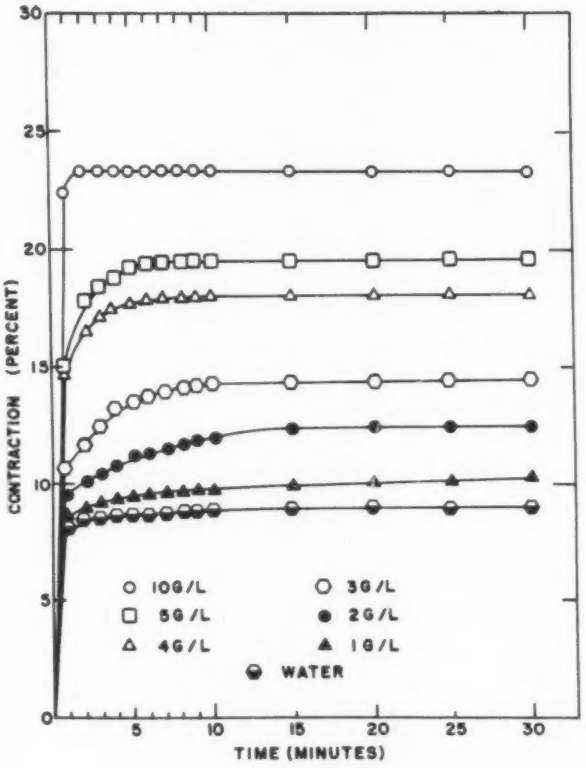


Figure 3
Rate of contraction of polyethylene terephthalate filaments at 95°C in the presence of o-phenylphenol.

the presence of phenol as a carrier is shown in Figure 2. The sharp increase in slope occurring in the range of 85 to 95°C is apparently the result of passing through the second order transition temperature of polyethylene terephthalate, which has been reported to be about 80°C (5).

Ninety-five degrees centigrade was selected as the temperature at which all measurements of contraction were to be carried out because it approximates the temperatures used in commercial practice.

Figure 3 shows the rate of contraction of polyethylene terephthalate filament in the presence of various concentrations of the insoluble carrier, o-phenylphenol. Most of the contraction takes place within the first minute of treatment and very little change occurs after 10 minutes. Similar observations were made using the soluble carrier, benzoic acid. It was decided that an immersion time of 30 minutes was sufficient to allow for complete contraction.

In Figure 4 is shown the dependency of contraction on concentration of carrier added to the bath. It can readily be seen that the water-insoluble carriers (o-phenylphenol, methyl salicylate, and methyl benzoate) are more effective in shrinking polyethylene terephthalate fiber than the water-soluble carriers (salicylic acid, phenol, sodium o-phenylphenate, and benzoic acid), and among the former group o-phenylphenol is the most efficient. The water-soluble carriers all produce about the same amount of contraction, when applied at a given concentration, with the exception of urea, which does not increase the contraction beyond that obtainable in pure water. Tripropyl phosphate is also ineffective as a swelling agent, as can be seen from Figure 5.

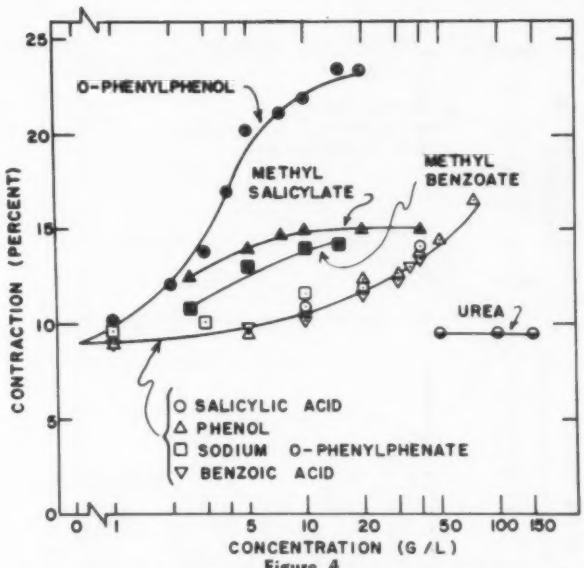


Figure 4
Comparison of the effects of various carriers on the contraction of polyethylene terephthalate filaments when treated for 30 minutes at 95°C.

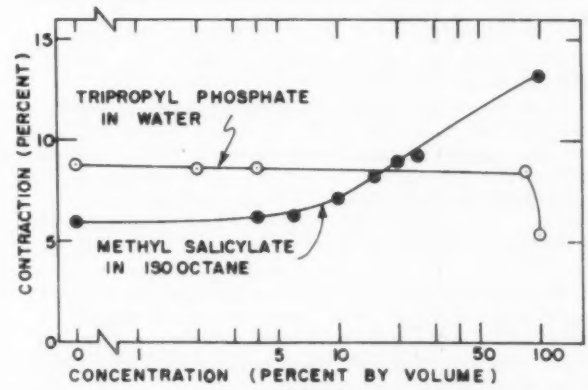


Figure 5
Contraction of polyethylene terephthalate filaments when treated for 30 minutes at 95°C in emulsions of tripropyl phosphate in water or in solutons of methyl salicylate in isooctane.

Several workers (*2, 6*) have shown that the essential action of a carrier in increasing rate of dye diffusion is within the fiber, rather than in the dyebath; ie, the carrier must be absorbed by the fiber. Schuler (*2*) and Glenz (*6*) found that the effectiveness of the carrier depends primarily on the concentration of absorbed carrier. It is interesting to note that neither of the nonswelling compounds, urea and tripropyl phosphate, is an effective dyeing assistant for polyethylene terephthalate fiber, whereas the other compounds under discussion swell the fiber and also promote the dyeing rate. It is likely that neither urea nor tripropyl phosphate is absorbed by the fiber, and such has actually been reported to be the case with tripropyl phosphate (*1*).

Schuler (*2*) and Glenz (*6*), each working with several carriers, found that they were all about equally effective when present in the fiber in equimolal concentrations. One may speculate that under the same condition the carriers used in this work will produce about the same amount of shrinkage. It is clear, however, that the water-soluble carriers would have to be added to the bath in much greater quantities than the water-

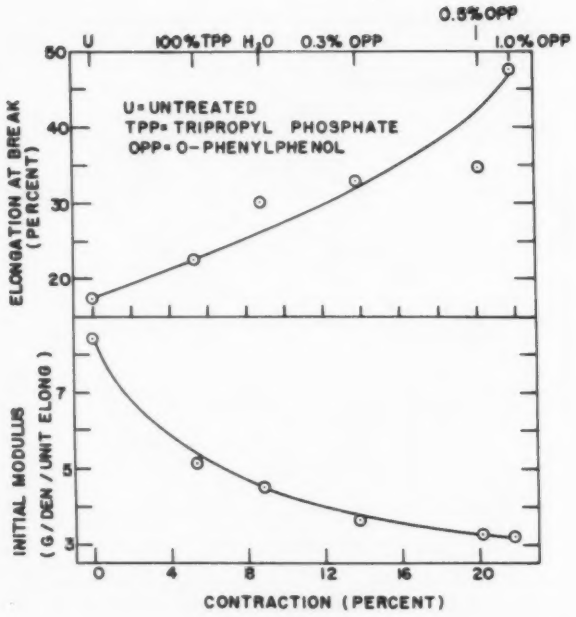


Figure 6
Effect of contraction on elongation at break and initial modulus of polyethylene terephthalate filaments.

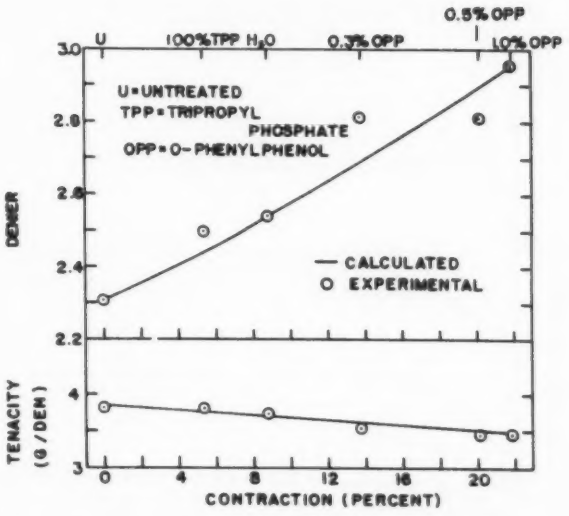


Figure 7
Effect of contraction on denier and tenacity of polyethylene terephthalate filaments.

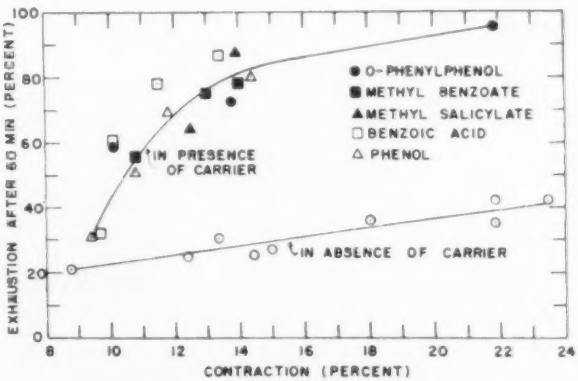


Figure 8
Exhaustion of dye as a function of contraction; polyethylene terephthalate filaments dyed at the boil in the presence and absence of carrier.

insoluble carriers since the aqueous phase is so greatly favored in the former case.

It is shown in Figure 5 that solutions of methyl salicylate in isooctane cause the fiber to contract. In pure isooctane the contraction is about 5.9%, close to that which is obtained in dry air. The contraction in pure methyl salicylate is 13% compared with the 15% which is obtained in a water emulsion of the carrier (see Figure 4). One possible explanation is the following: Schuler (2) showed that water increases the rate at which dyeing assistants diffuse through the fiber. If the fiber is not completely saturated when treated in pure methyl salicylate for 30 minutes, it is possible that more assistant might be taken up by the fiber in like time when water is present.

EFFECT OF CONTRACTION ON PHYSICAL PROPERTIES——The swelling of polyethylene terephthalate fiber by carrier agents shows up as changes in certain properties of the fiber. These changes were of sufficient magnitude to suggest significant differences in internal structure. For example, examination of X-ray diffraction patterns disclosed that significant deorientation occurred on "plasticizing" the fiber in 1% o-phenylphenol; it was apparent that the treatment also increased both the degree of crystallinity and the apparent size of the crystals. These structural changes are characteristic of polyethylene terephthalate fiber that has been relaxed by heat or by plasticizing agents (7).

As would be expected, the tensile properties of the treated fiber are affected by the swelling. Elongation at break increases and initial modulus decreases as the amount of contraction is increased (Figure 6). Denier increases in a predictable manner. The upper curve in Figure 7 was calculated from the original denier and the measured contraction; no allowance was made for the weight of carrier absorbed by the fiber. Tenacity based on the denier of unstrained fiber (Figure 7) decreases slightly; based on that the strained fiber, however, tenacity increases slightly. The changes in mechanical properties thus are consistent with those expected of fibers undergoing progressive reduction of orientation.

RATE OF UPTAKE——When the effects of various carriers on dyeing rate are compared, it is common to determine percent exhaustion of the dyebath after a certain time interval and to consider this is as a measure of rate of uptake. Although dyeing "rates" obtained this way are not strictly comparable, the method has the advantage of convenience. In Figure 8 is shown exhaustion of Latyl Violet 2R as a function of contraction when polyethylene terephthalate fiber was dyed for 60 minutes at the boil in the presence and absence of various carriers. The contraction data were obtained in the manner previously described on samples treated with carrier at various concentrations in the absence of dye. The exhaustion data in absence of carrier were obtained by dyeing fiber from which the carrier had been extracted.

Before discussing Figure 8, it is necessary to point out that the time of 60 minutes under the conditions of dyeing may be sufficient to reach equilibrium, provided the concentration of carrier is great enough. If, as was the

(*concluded on page 67*)

Disperse dyestuffs
for the dyeing
and printing of
polyester fibers
and blends

®Foron

ultra-dispersed®

The name "ultra-dispersed"
is your assurance of excellent
dispersibility... level dyeings
in the beck or jig... no
filtering-out in package or
other circulatory equipment.

SANDOZ
THINKS AHEAD WITH TEXTILES

SANDOZ

Sandoz

®Foron

ultra-dispersed dyes for outstanding color work on Polyester fibers

As pointed out in "The American Dyestuff Reporter"* a year ago, certain disperse dyes have specific affinity for polyester fibers and offer superior dyeing properties. Carefully selected dyes in this group also offer greater fastness to light and wet treatments, and to perspiration and crocking.

The Foron ultra-dispersed dyes, created by Sandoz research, were planned to fit into this classification to meet the needs of dyers and users of polyester fabrics.

The particle size of a Foron ultra-dispersed dyestuff is controlled to fall between 0.5 of a micron and 1 micron. Contrast this with the particle sizes mentioned in research papers on disperse dyes, where a fineness of 1-2 microns is described. The smaller Foron ultra-dispersed particle results in a more dispersible dye, giving level dyeings in the beck and jig, and freedom from filtering out in circulating dye liquors.

Another consequence of the ultra-dispersed particle size is a more desirable diffusion of the Foron dye throughout the polyester fiber.

It is their extra degree of solubility plus the particular molecular structure† of the Foron ultra-dispersed dyes which result in their improved fastness to light, sublimation, washing, perspiration, and crocking.

Wouldn't it seem wise to see how the Foron ultra-dispersed dyes will work in your formulations for polyester fiber dyeings?

And for Arnel‡ cellulose triacetate, too?

Call the nearest Sandoz District Sales Office today ... to ask for samples ... a shade card ... a demonstration. District Offices: Charlotte; Cincinnati; Fair Lawn, N. J.; Hudson, Mass.; Los Angeles; Philadelphia. SANDOZ, INC., 61-63 Van Dam Street, New York 13, N.Y. ALgonquin 5-1700.

*"Dyeing Behavior of Disperse Dyes on Hydrophobic Fibers," V. S. Salvin, Celanese Fibers Company, ("American Dyestuff Reporter," August 22, 1960).
†"The Chemistry of the Aminonaphthaquinones," E. Merian, SANDOZ, LTD., ("American Dyestuff Reporter," October 5, 1959).
‡T.M. Celanese Fibers Company.

SANDOZ
THINKS AHEAD WITH TEXTILES

SANDOZ

PROCEEDINGS

American Association of Textile Chemists and Colorists

Copyright, 1961, American Association of Textile Chemists and Colorists

May 1, 1961 No. 9

FOUNDER

LOUIS A OLNEY
(deceased)

COUNCIL OF THE ASSOCIATION

PRESIDENT ELLIOTT MORRILL, Corn Products Co, 1437 West Morris St, Indianapolis, 6, Ind

VICE PRESIDENTS (*New England Region*): W GEORGE PARKS, University of Rhode Island, Kingston, RI; (*Central Atlantic Region*): W S SOLLENBERGER, American Viscose Corp, Marcus Hook, Pa; (*Southern Region*): A HENRY GAEDE, Laurel Soap Mfg Co, PO Box 1083, Charlotte 1, NC; (*Western Region*): JOSEPH H JONES, Phoenix Dye Works, 4755 W 150th St, Cleveland 35, O

TREASURER ARTHUR R THOMPSON, 2132 Dilworth Rd E, Charlotte 3, NC

EXECUTIVE SECRETARY GEORGE P PAINE, AATCC National Headquarters, PO Box 28, Lowell, Mass

CHAIRMAN, EXECUTIVE COMMITTEE ON RESEARCH CHARLES A SYLVESTER, E I duPont de Nemours & Co, Inc, Rm 8516, Nemours Bldg, Wilmington 98, Del

PAST PRESIDENTS (Living) ELVIN H KILLHEFFER, P J WOOD, WILLIAM H CADY, CARL Z DRAVES, THOMAS R SMITH, WILLIAM D APPEL, HENRY F HERRMANN, C NORRIS RABOLD, J ROBERT BONNAR, GEO O LINBERG, WELDON G HELMUS

NATIONAL COUNCILORS REPRESENTING SECTIONS (*Northern New England*): J J O'NEIL JR, R D ROBINSON, D H THOMAS; (*Rhode Island*) K J BRODEN, E W LAWRENCE, F H CASEY, R B TAYLORSON; (*Western New England*): T J GILLICK JR, A W GOODWIN; (*Delaware Valley*): W H BERTOLET, 3RD, J E CONWAY, J H DAVIDS, V D LYON, L K McCHESNEY; (*Hudson-Mohawk*): H G GENDREAU, F J SZUREK; (*Metropolitan*): E C HANSEN, W A HOLST, J A KOMNINOS, R E MILLER, C R TROMMER, A R WACHTER, G S WHAM; (*Niagara Frontier*): J E LOUGHLIN; (*Northern Piedmont*): S M CONE JR, C HOOPER, H Y JENNINGS; (*Palmetto*): J C KING, L T KELLY, L C REYNOLDS; (*Piedmont*): F FORTESS, W E RIXON, R E RUPP, L L WYSS; (*South Central*): J D MOSHEIM, J O SWEITZER; (*Southeastern*): J C COOK, R B HALLOWELL, J W RICHARDSON; (*Washington*) N GETCHELL; (*Mid-West*): W O FISCHER, J G KELLEY, A J OLSON; (*Pacific Northwest*): R E NEWMAN; (*Pacific Southwest*): W E KRAMER

TREASURER EMERITUS

WILLIAM R MOORHOUSE
PO Box 352, South Yarmouth, Mass

CHAIRMEN, COMMITTEES OF THE COUNCIL

STANDING COMMITTEES—

Executive Committee of Council	ELLIOTT MORRILL
Executive Committee on Research	CHARLES A SYLVESTER
Technical Committee on Research	GEORGE S WHAM
Publicity	EDWARD ARTIM
Appropriations	THOMAS R SMITH
Membership and Local Sections	W GEORGE PARKS
Publications	PAUL J LUCK
Corporate Membership	W S SOLLENBERGER
Constitution and Bylaws	WILLIAM A HOLST
Conventions	E I STEARNS
Technical Programs	T R FOLTZ JR & J ROWATT
Archives	SIDNEY M EDELSTEIN
Textile Education	LEONARD SMITH
Subject and Speakers' Bureau	MATTHEW J BABEY

SPECIAL COMMITTEES—

Intersectional Contest	THOMAS J GILLICK JR
Employee Pension and Retirement Advisory	ELLIOTT MORRILL
Individual Membership	H A STAUDERMAN
Olney Medal	M HARRIS
Harold C Chapin Award	SIDNEY SPRINGER
American Dyestuff Reporter Award	PAUL B STAM
Student Award	JAMES L TAYLOR

NATIONAL HEADQUARTERS

PO Box 28, Lowell, Mass
Tel: GLenview 8-8034

Executive Secretary	GEORGE P PAINE
Technical Secretary	GEORGE J MANDIKOS

LOCAL SECTION OFFICERS

New England Region

NORTHERN NEW ENGLAND *Chairman*: EDWARD J McNAMARA JR, Hamilton Chemical Corp, Lowell, Mass; *Secretary*: JOSEPH S PANTO, Fabric Research Labs Inc, 1000 Providence Highway, Dedham, Mass; *Vice Chairman*: FRANK J RIZZO; *Treasurer*: WILLIAM W PENNOCK

RHODE ISLAND *Chairman*: JOHN J ROARKE, Bradford Dyeing Assoc, Bradford, RI; *Secretary*: RICHARD V DUGDALE, Rohm & Haas Co, 1226 Industrial Trust Bldg, Providence 3, RI; *Vice Chairman*: CHARLES A ROBINSON; *Treasurer*: HAROLD B STURTEVANT

WESTERN NEW ENGLAND *Chairman*: ALBERT H RANT, Laurel Soap Mfg Co, 206 Calla St, Providence 6, RI; *Secretary*: WILLIAM H ESPELIN, 7 Hearthwood Drive, Barrington, RI; *Vice Chairman*: TIMOTHY J HORAN; *Treasurer*: BURTON C WINKLER

Central Atlantic Region

DELAWARE VALLEY *Chairman*: CLARENCE A SEIBERT, Scholler Bros, Inc, Collins & Westmoreland Sts, Philadelphia 34, Pa; *Secretary*: ERNST W EMPTING, Verona Dyestuffs, 351 Lancaster Ave, Haverford, Pa; *Vice Chairman*: EDWARD G HAACK; *Treasurer*: CHARLES N KUZMA JR

HUDSON MOHAWK *Chairman*: FLOYD J SZUREK, Mohasco Industries, Inc, Amsterdam, NY; *Secretary*: ARMAND DI MEO, Rebel Dyeing Corp, Johnstown, NY; *Vice Chairman*: ACHILLES S MAFILIOS; *Treasurer*: WALTER DRAUTZ

METROPOLITAN *Chairman*: PERCY J FYNN, J C Penney Co, Inc, 330 W 34th St, New York, NY; *Secretary*: GEORGE A JONIC, American Cyanamid Co, 48 W 38th St, New York 18, NY; *Vice Chairman*: RICHARD P MONSAERT JR; *Treasurer*: EUGENE J GRADY

NIAGARA FRONTIER *Chairman*: ANTON M VIDITZ-WARD, Allied Chemical Corp, Elk St, Buffalo, NY; *Secretary*: DANIEL E BOLAND, Western Electric Co, Inc, Buffalo, NY; *Vice Chairman*: NICHOLAS MOHORUK; *Treasurer*: JOHN NIHILL

Southern Region

NORTHERN PIEDMONT *Secretary pro tem*: JAMES E GREER, Burlington Mills Corp, Greensboro, NC

PALMETTO *Chairman*: RICHARD E RETTEW, Polymer Southern, Box 2184, Greenville, SC; *Secretary*: E THOMAS McILWAIN, Ansbacher-Siegel Div, Sun Chemical Co, Rock Hill, SC; *Vice Chairman*: NEAL A TRUSLOW; *Treasurer*: WILLIAM E BALDWIN

PIEDMONT *Chairman*: VINCENT B WRIGHT JR, North Carolina Finishing Co, PO Box 1100, Salisbury, NC; *Secretary*: E P LAVOIE, Morningstar-Paisley, Inc, PO Box 3622, Charlotte, NC; *Vice Chairman*: V B HOLLAND; *Treasurer*: ROBERT L WARD

SOUTH CENTRAL *Chairman*: RICHARD J TYRRELL, Peerless Textile Div, Burlington Industries, Cleveland, Tenn; *Secretary*: W JACK WELBORN, Riegel Textile Corp, Trion, Ga; *Vice Chairman*: LOWELL SHIVE; *Treasurer*: ARTHUR R WILLIAMS

SOUTHEASTERN *Chairman*: WILLIAM B AMOS, The Jefferson Mills, Inc, Jefferson, Ga; *Secretary*: RICHARD M JONES, Chemical Services, Inc, Box 8007, Station F, Atlanta, Ga; *Vice Chairman*: LEON TIGLER; *Treasurer*: RICHARD D SEED

WASHINGTON *Chairman*: LOUIS R MIZELL, Harris Research Labs Inc, 6220 Kansas Ave, NE, Washington 11, DC; *Secretary*: FLORENCE H FORZIATI, National Bureau of Standards, Textiles Section, Washington 25, DC; *Vice Chairman*: ESTHER L BATCHELDER; *Treasurer*: EDMUND M BURAS JR

Western Region

MID-WEST *Chairman*: JAMES L McGOWAN, Morgan Dyeing & Bleaching Co, Rochelle, Ill; *Secretary*: ARTHUR J ANDREWS, Keystone Aniline & Chemical Co, 321 North Loomis St, Chicago 7, Ill; *Vice Chairman*: FRANK S STOVER; *Treasurer*: JAMES E MILLER

PACIFIC NORTHWEST *Chairman*: HUBERT N SHEA, Jantzen, Inc, 411 NE 19th Ave, Portland 14, Ore; *Secretary*: JOHN F SHELTON, Great Western Chemical Co, Portland, Ore; *Vice Chairman*: ROBERT WELSH; *Treasurer*: DALE W KIMSEY

PACIFIC SOUTHWEST *Chairman*: ANGUS H ROBERTS Nopco Chemical Co, Hermosa Beach, Calif; *Secretary*: RICHARD C DEMUTH, Dye Masters Inc, 1511 W Florence Ave, Inglewood 3, Calif; *Vice Chairman*: DAVID D SANDERS; *Treasurer*: FREDERICK L WILHELM

STUDENT CHAPTERS

Auburn University, Bradford Durfee College of Technology, Clemson College, Georgia Institute of Technology, Lowell Technological Institute, New Bedford Institute of Technology, North Carolina State College, Philadelphia College of Textiles and Science

IDENTIFICATION OF ANTIBACTERIAL AND MILDEWPROOF FINISHES

T D MILES

Chairman, Committee RA45

In considering the problem of developing qualitative methods for the identification of finishes, Committee RA45 drew up a list of finishes that would be found on textiles and divided these into 11 major categories. A test method is to be developed for each category. The categories are listed in AATCC Tentative Test Method 94-1959T, Analysis of Finish in Textiles (pp 69-72, *1960 Technical Manual*).

The following method has been completed for category 2, antibacterial, mildew-resistant, sanitizer, etc. It is designed to fit into AATCC Test Method 94. In checking the method, commercial fabrics, advertised as antibacterial treated, were circulated to the members of the Committee for analysis. These were found to contain metallic, quaternary and antibiotic types using the method. After approval by the Committee, the method was circulated to seven companies which produce finishes of this type. Their comments were favorable.

The Committee wishes to acknowledge the cooperation of the producers of this type of finish for their assistance in providing comments and information on methods for their products.

COMMITTEE RA45
IDENTIFICATION OF FINISHES ON TEXTILES

T D Miles, Chairman
H L Eisen, Secretary

L A Blais	R T O'Connor
C H Brubaker	C Of
H B Goldstein	W N Parsons
L C Kolodny	A L Smith
R R Krammes	R H Souther
R K Kunkel	F J Szurek
G E Lanciault	R L Wayland Jr
B R Norwick	M Kathryn Wharton

ANALYSIS OF FINISH IN TEXTILES

Tentative Test Method
94-1961T

Category 2—Antibacterial, Mildewproof

PRINCIPLE

THE finish is first classified as one falling into this category by the use of AATCC Test Method 30 and/or AATCC Test Method 90. The latter may also be run on laundered samples to establish whether the antibacterial finish remains after washing. A list of industrial fungicides has been prepared by the Prevention of Deterioration Center (*1*). The large number of chemicals used in this category (the reference cited lists 140 different chemicals or combinations) was the deciding factor in limiting the present method to one designed to establish the general type rather than the specific compound.

PROCEDURE

A 20-g sample of the fabric is extracted according to the general procedure of AATCC Test Method 94. The residue from each extraction is redissolved in a small amount of the solvent for spotting on paper chromatogram. It is advisable to run a blank paper spotted with the solvent (100 ml reduced to approximately five ml by evaporation) used for extraction through the various developing procedures to insure that interferences such as trace metals are not present. Since Rf values can vary with conditions used, it is advisable to run a known compound as a control. Experience with the color-development procedures using known compounds should also be obtained.

CHROMATOGRAPHIC METHODS——(Whatman 3MM for paper chromatography is used). It is recommended that chromatograms be run under controlled temperature and humidity conditions such as those of a textile test laboratory (70°F, 65% rh).

I) *Horizontal.* A Petri dish approximately six inches in diameter is suitable. Cut a circle of paper slightly larger in diameter than the Petri dish. From the edge to the center of the circle, cut a ¼-inch-wide straight strip. This serves as a wick to carry the solvent. Place a few drops (a glass stirring rod or medicine dropper may be used) of the solution being tested at the center of the circle of paper. Air dry the paper. Cover the bottom of one Petri dish with the appropriate elutent. Place the circle of paper over the Petri dish, allowing the wick to be immersed in the elutent. Cover with another Petri dish. Allow the elutent to cover at least two-thirds of the area of the circle of paper inside the dish. Do not allow the elutent to reach the edge of the Petri dish. Then remove the paper, mark the leading edge of the elutent with a pencil mark (for Rf determination) and allow the paper to dry. The paper circle is then cut into pie-shaped segments from the origin to the elutent edge and developed. The color-developing reagents may be sprayed onto the paper. The Rf value is the distance from the origin to the compound (developed as a characteristic colored ring) divided by the distance from the origin to the solvent edge.

II) *Ascending.* Approximately 400 ml of the elutent is placed in a two-liter cylinder topped with a rubber stopper. A rubber stopper of smaller diameter is fastened to the bottom of the larger one and serves as a means of holding the paper. A strip of paper approximately 18 inches long and two inches wide is spotted with the solvent about four to five inches from one end. The paper is then attached to the smaller rubber stopper and suspended in the cylinder containing the elutent. The cylinder is sealed with masking tape.

ELUTENTS——(Vol/vol unless indicated otherwise).

1) butanol-HCl [80% butanol, 10%

distilled water and 10% conc HCl]

2) ethanol-HCl [35% ethanol (denatured), 5% conc HCl and 60% distilled H_2O]

3) ethanol-NaOH [85% NaOH (2.5% wt/vol), 15% ethanol (denatured)]

DEVELOPING REAGENTS——

a) CI Basic Violet 10—CI Fluorescent Brightening Agent 54 [5 ml of a 0.2% wt/vol aqueous solution of CI Basic Violet 10 (CI 45170) with 10 ml of a 0.2% wt/vol aqueous solution of CI Fluorescent Brightening Agent 54, adding 40 ml of ammonia solution SG 0.880 and diluting with water to 100 ml]. This reagent must be freshly prepared immediately before use.

b) Dithizone (10 mg dithizone in 100 cc CCl_4).

c) Murexide (one mg murexide/one ml of ethylene glycol).

d) Potassium ferrocyanide (6% wt/vol aqueous solution).

e) Ammonia fumes (from conc ammonium hydroxide).

f) 4-Aminoantipyrine (2% solution wt/vol in 0.025% wt/vol sodium carbonate).

g) Potassium ferricyanide solution (8% aqueous).

CLASSES OF INHIBITORS——

[The same general classes of the Prevention of Deterioration list (*1*) are followed].

1) *Metallic.* The metallics are identified using chromatographic method I and elutent 1. Characteristic color developments are shown below. Tin is identified from the ash of the sample using either the quantitative dithiol method (*6*) and Appendix I or the qualitative molybdenum blue test based on Feigl (*7*) and Appendix II. Examples of this group are copper naphthenate, copper-8-quinolinolate, phenyl-mercuric acetate, cadmium chloride, zinc chloride and tributyl tin oxide. When used as mildew inhibitors, about 1% metal based on the fabric weight is present. As antibacterial finishes, about 20 ppm metal may be present with laundry resistance achieved by resin binders or mordants. In such cases it is difficult to distinquish metal present as a trace impurity from that present as a finish with the exception of unusual metals such as tin and mercury.

Ion	*Rf*	*Developing Reagents*			
		a	*b*	*c*	*d*
Zn	0.8	negative	pink	yellow	negative
Hg	0.8	negative	orange	pink	green
Fe	0.8	negative	green	yellow	blue
Cd	0.8	negative	orange	yellow	negative
Cu	0.4	blue	negative	orange	red

2) *Phenolics.* Phenolics are identified using chromatographic method I and elutent 1. Developing reagent f followed immediately be reagent g produces a distinct red color at Rf 1 when the paper is placed in ammonia fumes. Examples of such compounds are hexachlorophene (2,2′ methylene bis (3,4,6-trichlorophenol), dihydroxydichlorodiphenyl methane (2,2′ methylene bis (4-chlorophenol), orthophenyl phenol, etc. When used as mildew inhibitors, about 1 to 2% of the compound is present. Quantitative methods are available (*5*). When used as antibacterial compounds, concentrations in the range of 0.2% have been used.

3) *Antibiotic.* An example is neomycin sulfate. This compound gives a distinctive color reaction with Texchrome (fiber identification dye). When the blue dye is spotted on paper containing neomycin sulfate, a distinctive red border to the blue dye develops. An indicator can be prepared from six grams Acid Fuchsine (CI 42685) (biological stain), 10 g picric acid, 10 g tannic acid, 5 g CI Acid Blue 22 (CI 42755) diluted with water to one liter (*8*). With this indicator, neomycin sulfate gives a yellow border to the green stain. Its presence on fabrics can be detected in the acid extract when it is run by the chromatographic method for determining resins (*3*). A thin line of the indicator is painted down the dry chromatogram and the presence of neomycin sulfate is indicated by a distinct red border to the stripe of blue dye in the immediate vicinity of the origin. With the other stain a yellow border to the green dye is produced.

4) *Quaternary Ammonium Compounds.* These are identified using chromatographic method II and elutent 2. When sprayed with reagent a, and viewed under UV light, quaternary ammonium compounds give a crimson fluorescent spot (*4*). Examples of compounds in this group are quaternary ammonium naphthenate, alkyl benzyldimethyl ammonium chloride, dodecyldimethylbenzyl ammonium cyclopentane carboxylate, etc. The chromatographic method reference (*4*) can detect 0.6 micrograms of the quaternary base. Although the method is designed for the separation within the homologous series of saturated n-alkyltrimethylammonium halides, n-alkylbenzyldimethylammonium halides and n-alkylpyridinium halides, the lack of information on the Rf values for a wide variety of other quaternaries prevents making any conclusions about the chemical structure of commercial products from their Rf values with this test. Quaternary ammonium wetting agents, if present on the fabric, will also give a positive test.

5) *Miscellaneous.* Salicylanilide can be identified using chromatographic method I with elutent 3. A fluorescent blue color is developed at Rf 0.7 when viewed under UV light (*2*).

REFERENCES

(*1*) Wessel, C J, and Bejuki, W M, "Industrial Fungicides", *Ind Eng Chem 51*, 52A-63A (1959).

(*2*) Miles, T D, and Delasanta, A C, "Qualitative Chromatographic Method for Identifying Mildew Inhibitors on Military Fabrics", *Am Dyestuff Reptr 48*, 31-2 (1959).

(*3*) Norwick, B, and Bierig, E, "A Chromatographic Method for the Identification of Amino Aldehyde Finishes on Textiles", *ibid 46*, 314-5 (1957).

(*4*) Holness, H, and Stone, W R, "The Separation of Quaternary Halides by Paper Chromatography", *Analyst 83*, 71-5 (1958).

(*5*) Gottlieb, S, and Marsh, P B, "Determination of Phenolic Fungicides", *Ind Eng Chem Anal Ed 18*, 16-9 (1946).

(*6*) Permachem Corp, West Palm Beach, Fla.

(*7*) Feigl, F, "Qualitative Analysis by Spot Tests: Inorganic and Organic Application", Trans R E Oesper, 3rd English edition, Elsevier Pub Co, New York (1946).

(*8*) Davis, H L, and Rynkiewicz, H J, *Ind Eng Chem Anal Ed 14*, 472 (1942).

APPENDIX I

Determination of Tributyl Tin Oxide with Dithiol (*6*)

A) PREPARATION OF CALIBRATION CURVE FOR TIN——

1) *Standard tin solution (strong: one ml = 0.2 mg Sn).* Weigh and transfer 0.2000 g pure tin to a 1000-ml volumetric flask and add 250 ml HCl. When solution of the tin is complete, dilute with water, cool, make up to volume and mix well.

2) *Standard tin solution (weak: one ml = 0.04 mg Sn).* Pipette 100 ml of the strong standard tin solution into a 500-ml volumetric flask, dilute to volume and mix well.

3) *Sulfuric acid solution (3:7).* Add 150 ml H_2SO_4 to 200 ml cold H_2O, transfer to a 500-ml volumetric flask, cool, dilute to volume and mix well.

4) *Thioglycollic acid.* Use as received from the Matheson Company, Inc, East Rutherford, NJ.

5) *Dithiol reagent (0.30%).* Weigh 0.15 g dithiol (A D Mackay, New York, NY) into a 100-ml beaker, add eight drops thioglycollic acid and then add 50 ml NaOH solution (2%). Stir

well to dissolve. If the solution is not clear, filter through a dry, fine-grained filter paper into a clean, *dry*, glass-stoppered bottle and store in a refrigerator. Normally, the solution is stable for one week, but should be checked daily against standard tin solution before using.

6) *Sodium lauryl sulfate solution (2%).* Weigh and transfer 10 g sodium lauryl sulfate to a 500-ml volumetric flask. Add 400 ml warm H_2O (about 40°C) and swirl gently to dissolve. Cool, dilute to volume and mix well. This solution may be slightly cloudy; this is of no concern, however, for solution is complete when this solution is added to the acid solution.

7) *Calibration solutions.* Into four 50-ml volumetric flasks, pipette 10 ml sulfuric acid solution (3:7). Pipette two, five, 10 and 20 ml of the standard tin solution (one ml = 0.04 mg Sn) into four 50-ml volumetric flasks. Add five drops thioglycollic acid to each, wash down walls of flasks with H_2O and swirl to mix well. Proceed in accordance with Paragraph 9.

8) *Blank solution.* Pipette 10 ml sulfuric acid solution (3:7) into a 50-ml volumetric flask. Dilute to about 40 ml with H_2O and add five drops thioglycollic acid, swirl to mix. Proceed in accordance with Paragraph 9.

9) *Color development.* Pipette into each flask two ml sodium lauryl sulfate solution (2%). Swirl gently for about 15 seconds to mix well (avoid excess foaming). Pipette into each flask one ml dithiol reagent (0.30%) while keeping the solution in motion by swirling gently. Cool, dilute to volume and then mix well.

10) *Photometry.* Transfer suitable portions of the solutions to absorption cells (one cm) and with the blank solution set at 100% transmittancy, measure the transmittance of the solutions at 530 mm. The color is stable for at least one hour.

11) *Calibration Curve.* Plot the photometric readings of the calibration solutions against milligrams of tin per 50 ml of solution.

B) DETERMINATION OF TIN FOR SAMPLES CONTAINING NO INTERFERING METAL CONTAMINANTS——After first making up the tin calibration curve as outlined in steps 1-9, the below detailed procedure should be followed in assaying samples.

To a 2.5-g sample of material in a 600-ml beaker, add 50 ml of concentrat[illegible] HNO_3 plus 15 ml of concentrated H_2SO_4. Place in the beaker a Pyrex glass stirring rod, which has been etched about two inches on one end with emery paper. This serves to control the boiling and bumping of the solution. Cover beaker with a Pyrex ribbed watch glass (Speedi-Vap, Scientific Glass Apparatus Co, Bloomfield, NJ) and heat on hot plate to boiling. Continue heating gently until fumes of SO_3 appear. Remove from hot plate and allow to cool for fifteen minutes. Add 25 ml concentrated HNO_3 and one ml of 70% perchloric acid, swirl beaker and replace on hot plate. Boil till fumes of SO_3 appear. It is necessary prior to this point, to keep the solution swirling to aid the escape of the gases formed during the oxidation; otherwise, spattering and bumping may take place. At this point, the solution should be water-white. If not, grasp the beaker tongs and swirl at boiling point over a Meeker burner for a few minutes to decolorize. If the color still persists, cool for fifteen minutes and add 25 ml HNO_3 and one ml perchloric acid and again bring to fumes of SO_3 by boiling on hot plate. When solution is free of organic material and solution shows heavy fumes of SO_3, fume for at least five minutes.

Cool H_2SO_4 solution and add about 20 ml water by rinsing watch glass and stirring rod. Transfer to 100-ml volumetric flask, rinsing beaker well in the transfer. Cool, dilute to volume, withdraw 20-ml aliquot, and transfer to 50-ml volumetric flask. Dilute to about 40 ml with water, and then add five drops thioglycollic acid and swirl for 15 seconds. Add two ml of a 2% solution of sodium lauryl sulfate and swirl one minute. Add one ml dithiol solution and swirl vigorously for one minute, to develop pink color reaction. Dilute to 50 ml and shake 10-15 seconds. Read on colorimeter against blank solution prepared as described in paragraph 9 of section A.

In cases where dyed fabrics are to be assayed and the color of the dye carries through, an untreated control should be run to obtain the blank. If an untreated sample is not available, the sample may be compared, after dithiol color development, to same aliquot of the sample containing thioglycollic acid, sodium lauryl sulfate, but no dithiol.

The formula for determining parts per million tributyl tin oxide in the sample is as follows:

$$\text{ppm TBTO} = \text{mg tin}/50 \text{ ml} \times \frac{}{10 \times 500}$$

C) DETERMINATION OF TIN FOR SAMPLES CONTAINING METAL CONTAMINANTS——After first making up the tin calibration curve as outlined in steps 1-9, the below detailed procedure should be followed in assaying samples.

To a 2.5-g sample of material in a 600-ml beaker, add 50 ml of concentrated HNO_3 plus 15 ml of concentrated H_2SO_4. Place in the beaker a Pyrex glass stirring rod, which has been etched about two inches on one end with emery paper. This serves to control the boiling and bumping of the solution. Cover beaker with a Pyrex ribbed watch glass (Speedi-Vap, Scientific Glass Apparatus Co, Bloomfield, NJ) and heat on hot plate to boiling. Continue heating gently until fumes of SO_3 appear. Remove from hot plate and allow to cool for fifteen minutes. Add 25 ml concentrated HNO_3 and one ml of 70% perchloric acid, swirl beaker and replace on hot plate. Boil till fumes of SO_3 appear. It is necessary, prior to this point, to keep the solution swirling to aid the escape of the gases formed during the oxidation; otherwise, spattering and bumping may take place. At this point, the solution should be water-white. If not, grasp the beaker with beaker tongs and swirl at boiling point over a Meeker burner for a few minutes to decolorize. If the color still persists, cool for fifteen minutes and add 25 ml HNO_3 and one ml perchloric acid and again bring to fumes of SO_3 by boiling on hot plate. When solution is free of organic material and solution shows heavy fumes of SO_3, fume for at least five minutes.

Introduce two g hydrazine sulfate (powdered solid) with the aid of a minimum amount of water to the distillation apparatus (cf Figure 7. Apparatus 5, "ASTM Methods for the Chemical Analysis of Metals", p 12, 1950). Transfer the sulfuric acid solution of the sample, containing not less than 0.04 mg and not more than 0.8 mg tin, to the distillation apparatus with the aid of not more than 20 ml H_2O. Add 10 ml H_3PO_4 and 20 ml HCl.

Add 50 ml H_2O to a 400-ml beaker and place under the condenser so that the tip is submerged at least ¼". The apparatus should be so arranged that the distillate can be removed at any time (Note #1). Place 150 ml HCl in the acid bulb, start a slow stream of CO_2 through the solution, bring to a boil and boil gently. At the same time introduce the HCl from the bulb into the flask at a rate of about

10 drops per minute. When the temperature has reached 155°, increase this rate to about 40 drops per minute, and maintain the temperature between 155°-170°C. When about 125 ml HCl has been introduced into the flask, allow the distillation to continue at the same rate and temperature, but remove distillate, wash down stem of condenser and replace the first beaker with a 200-ml tall-form beaker containing 25 ml H_2O. When only approximately one to two ml HCl remains in the bulb, close the stopcock to shut off flow of HCl, shut off heat, and when the temperature has dropped to 150°C, lower the distillate until free of the condenser and wash down stem of condenser with water. Discard both distillates.

Note #1.

If it is known that no As or Sb is present, the distillation with HCl may be omitted. In this event, start a slow stream of CO_2 through the solution, bring to a boil and boil gently until the temperature has reached 160°C. Then remove source of heat; lower the distillate until free of the condenser, wash down stem and discard distillate. Continue as directed in the following paragraph.

Immediately place a 200-ml tall-form beaker containing 20 ml of H_2O and 10 ml H_2SO_4 (3:7) under the condenser so that the tip of the condenser is about ¼" from the bottom of the beaker. Place 45 ml of a mixture of HCl and HBr (15 ml HCl—30 ml HBr) in the acid bulb, and when the temperature has dropped to 148°C, begin to introduce the acid from the bulb. Introduce the acid into the flask at a rate of 40 drops per minute and maintain the temperature between 140-150°C. When only approximately one ml of the acid remains in the bulb, close the stopcock to shut off the flow of acid, shut off heat. When temperature has dropped to 130°C, lower the distillate until free of the condenser. Wash down the stem of the condenser with water. Shut off flow of CO_2.

Transfer distillate from 200-ml tall-form beaker to 100-ml volumetric flask, rinsing beaker in making the transfer. Cool to room temperature after mixing well and dilute to mark. Transfer a 20-ml aliquot back to the 200-ml tall-form beaker and add eight ml of H_2SO_4 (3:7). Place an etched stirring rod in beaker and cover with ribbed watch glass. Heat on hot plate to near boiling, remove from hot plate, and add two ml concentrated HNO_3 dropwise, slowly. Replace on hot plate and continue heating.

APPENDIX II
Molybdenum Blue Test for Tin

Use a three-inch square of sample cloth. Place in a platinum dish and ash until no black residue is visible. Hydrolyze the residue with a few drops of water and heat to dryness. Allow dish to cool, then add about one ml of conc HCl. Add a small pinch of zinc dust and heat, being certain that all zinc dissolves. Evaporate the solution to dryness. Dissolve residue with three or four drops of water and then add three or four drops of 5% phosphomolybdic acid. A blue color indicates tin. (Do not heat after the reagent is added.)

AATCC Calendar

COUNCIL
Sept 26 (Statler Hotel, Buffalo, NY); Council (8 PM)
Nov 17 (Hotel Sherman, Chicago, Ill); Council and Annual Meeting (2 PM)
Jan 26 (Hotel Commodore, New York, NY); Council (10 AM)

NATIONAL CONVENTIONS
Sept 27-29, 1961 (Hotel Statler, Buffalo, NY); 1962 (Atlanta Biltmore Hotel, Atlanta, Ga); 1963—Boston; 1964—New York; 1965 (Conrad Hilton Hotel, Chicago, Ill)

DELAWARE VALLEY SECTION
May 19 (Outing—North Hills CC, North Hills, Pa); Sept 15 (Wilmington, Del); Oct 27, Dec 1 (Beck's Restaurant, Philadelphia, Pa)

HUDSON-MOHAWK SECTION
May 12 (Ladies Night); June 23 (Outing—Antlers Club, Amsterdam, NY)

METROPOLITAN SECTION
May 19—(Kohler's Swiss Chalet, Rochelle Park, NJ—Ladies Night).

MID-WEST SECTION
June 24 (Annual Outing—Ceramí's Island View Resort, Burlington, Wis); Nov 18 (Chicago, Ill)

NIAGARA FRONTIER SECTION
May 18 (Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
May 5-6 (New England Regional Meeting, Jug End Barn, S Egremont, Mass); Sept 8 (Annual Outing); Oct 20 (Quartermaster R & E Command, Natick, Mass); Dec 18 (Motel 128, Dedham, Mass); Jan 19 (Woodlawn Country Club, Newton, Mass)

PACIFIC NORTHWEST SECTION
May 26; Aug 5 (annual outing); Nov 10 (business meeting)

PACIFIC SOUTHWEST SECTION
May 19, Sept 30 (outing), Nov 17

PALMETTO SECTION
June 8-10 (joint outing with Piedmont Section at Grove Park Inn, Asheville, NC); Sept 15-16 (Clemson House, Clemson, SC); Jan 20-21 (Poinsett Hotel, Greenville, SC); April 14-15, 1962 (Francis Marion Hotel, Charleston, SC)

PIEDMONT SECTION
June 9-10 (Outing, Grove Park Inn, Asheville, NC); Sept 23 (Hotel Barringer, Charlotte, NC)

RHODE ISLAND SECTION
May 5-6 (New England Regional Meeting, Jug End Barn, South Egremont, Mass); June 23 (Outing); Sept 15 (Management Meeting); Oct 17 (Dinner Meeting); Dec 1 (Annual Business Meeting)

SOUTH CENTRAL SECTION
June 16-17 (Summer Outing—Riverside Hotel); Sept (Hotel Patten—tentative)

SOUTHEASTERN SECTION
June 9-10 (Summer Outing, Radium Springs, Albany, Ga); Sept 9 (Ida Cason Gardens, Pine Mountain, Ga); Dec 2 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
May 5-6 (New England Regional Meeting, Jug End Barn, S Egremont, Mass); May 19 (Ladies Night—Rapp's Paradise Inn); June 9 (Annual Outing); Sept 15 (Plant visitation); Oct 27 (Annual Meeting); Dec 1 (Shelton, Conn)

The following method has been submitted by B Norwick to the AATCC Committee on Identification of Finishes on Textiles for its evaluation as a possible method for identifying sizes, the current interest of this group. Its publication is welcome since it provides the opportunity for all interested members of the textile and chemical industries to participate in its evaluation in addition to providing evidence that individual committee members do not forfeit their rights to develop and publish their own methods by being members of this group.
———Thomas D Miles, Chairman Committee RA45

ANALYSIS OF FILM-FORMING FINISHES IN TEXTILES

BRAHAM NORWICK
Textile Division, Beaunit Mills, Inc

A method for the analysis of film-forming finishes in textiles is offered for textile and chemical industry consideration. The method is written up in the form of AATCC Test Method 94, where it fits as Category 1. The analytical system suggested is based very largely on infrared technique. As in the existing tentative test method, selective solvent solubility is used to separate the various materials which may be encountered. Once the materials have been separated, they are checked by infrared spectra, using either unsupported films of the extracts, or potassium bromide pellets prepared by standard methods. These spectra are compared with known spectra, which in many instances are able to pinpoint the type or chemical nature of the particular film former. Micro tests, such as the Liebermann-Storch reaction, are used for confirmatory indications. References to additional spectra are given.

INTRODUCTION

THE AATCC Research Committee on the Identification of Finishes on Textiles has continued to make rapid progress under the leadership of Thomas D Miles of the Quartermaster Research and Engineering Center at Natick, Mass, but there are still a majority of the eleven categories noted in AATCC Tentative Test Method 94-1959T, which do not yet have a specific testing outline. Among these is the very first category on adhesive, abrasion resisting, binder, coating, size, slipproof, stiffener, snag resisting, and nonlinting finishes. It is our purpose to suggest a method, which we hope to see evaluated critically both by members of the Research Committee and other interested parties in the textile and chemical industries. The method is offered in the form of AATCC Test Method 94:

Category 1—(Film Formers). Adhesive, Abrasion Resisting, Binder, Coating, Size, Slipproof, Stiffener, Snag Resisting, Nonlinting.

This class of materials can be found in yarns, nonwovens, greige goods and all types of finished fabrics.

PRINCIPLE

The finish is first classified by comparison of the textile material with a comparable construction free of "sizing". It should be noted that all fibers may yield extracts which resemble added film formers. Cotton may lose low molecular weight carbohydrate in the water extract, nylon may lose low molecular weight polyamide in the alcohol extract. Particular attention must be paid to the presence of fiber "dust" or abrasion particles, which should be filtered or centrifuged out of extracts.

PROCEDURE

Approximately 10 grams of the textile material is extracted with the full series of solvents in the order given in the tentative test method. The extracts are gently dried in small weighed dishes and examined for solid residue or film formers. In many cases, perfectly transparent films can be formed, so that weighing of the dishes is essential in deciding the presence or absence of extract. It will usually be necessary to re-extract the extract with other solvents in order to separate contaminants.

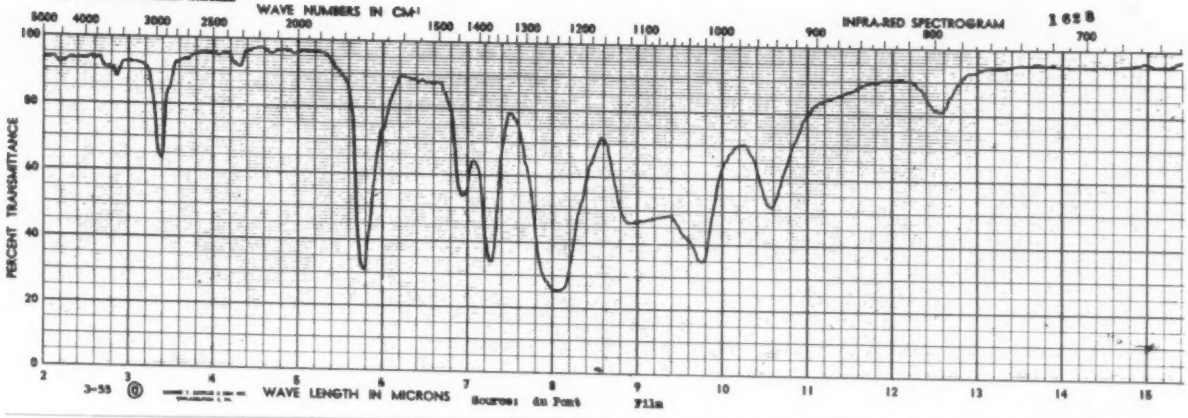
GROUP 1—TRICHLORETHYLENE EXTRACTS———This group may be contaminated with lubricants and plasticizers, which can be removed by petroleum ether, leaving a residue, generally in continuous film form, of natural or synthetic resin. These may be hard, soft, or rubbery. The latter are hard to strip and may be redissolved for further examination. Most of these materials are readily distinguished from one another by infrared spectra, either as free films or in potassium bromide pellets.

1) polyvinyl acetate
2) polyacrylates
3) ethyl cellulose
4) rosin and derivatives
5) polyvinyl chloride
6) rubber hydrochloride
7) alkyds
8) styrene derivatives
9) polyethylene

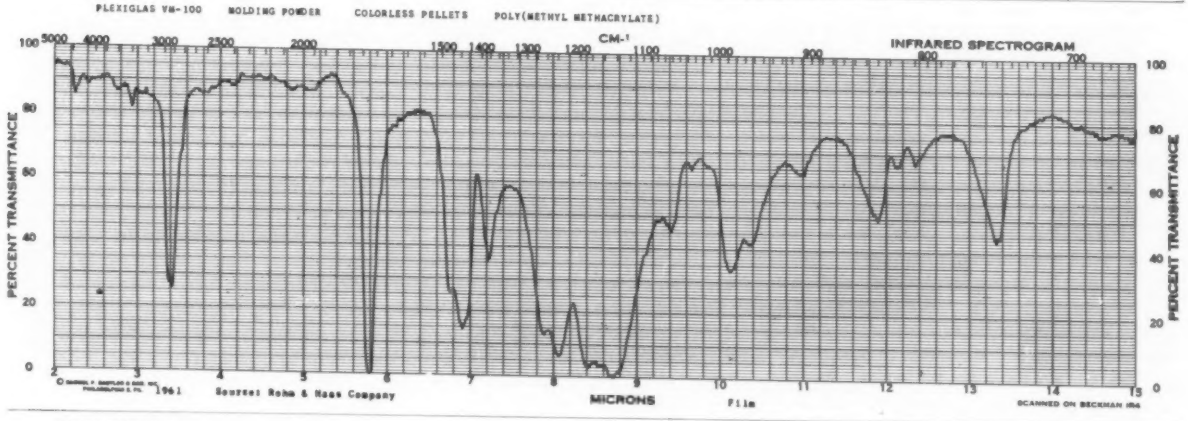
Confirmatory Tests. Polyvinyl acetate gives a positive test with lanthanum nitrate. A 5% aqueous lanthanum nitrate solution plus one drop of 0.1N iodine solution, plus one drop of concentrated ammonium hydroxide added to a small amount of the film former yields the color. Polyvinyl acetate turns purple to black. Cellulose acetate turns red-orange as do ethyl cellulose and some of the polyacrylates. The Liebermann-Storch reaction is carried out by placing a small amount of resin on a spot plate and covering with one or two drops of acetic anhydride. One drop of concentrated sulfuric acid is then added and mixed. The color reactions should be watched for a period of one-half hour.

1) Polyvinyl acetate turns green-blue.
2) Polyacrylates are generally negative.
3) Ethyl cellulose gives an orange to a brown to a black.
4) Rosin derivatives give red, violet, green, brown and black.
5) Polyvinyl chloride turns slowly to blue.
6) Rubber hydrochloride negative.
7) Alkyds generally negative or yellow to brown.
8) Styrene derivatives negative.
9) Polyethylene negative.

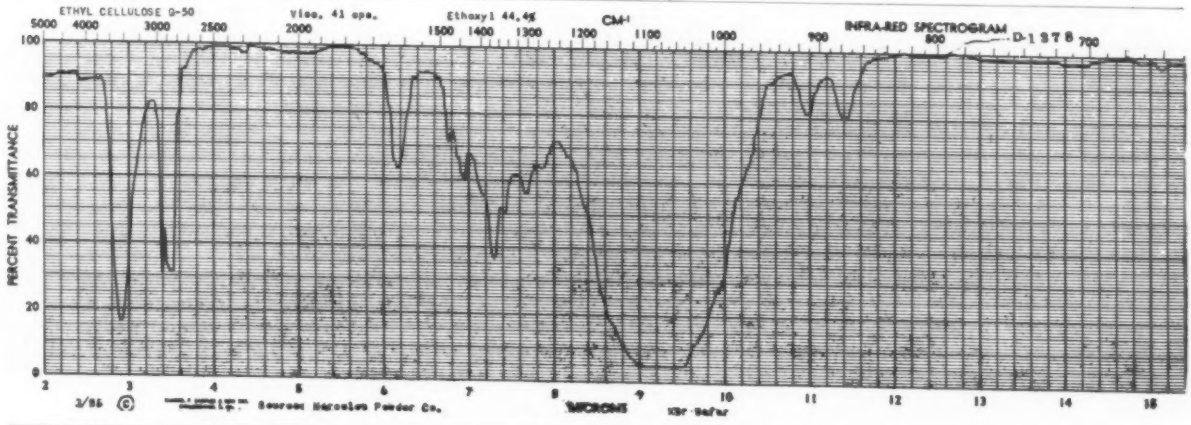
AD-9700 POLYVINYL ACETATE



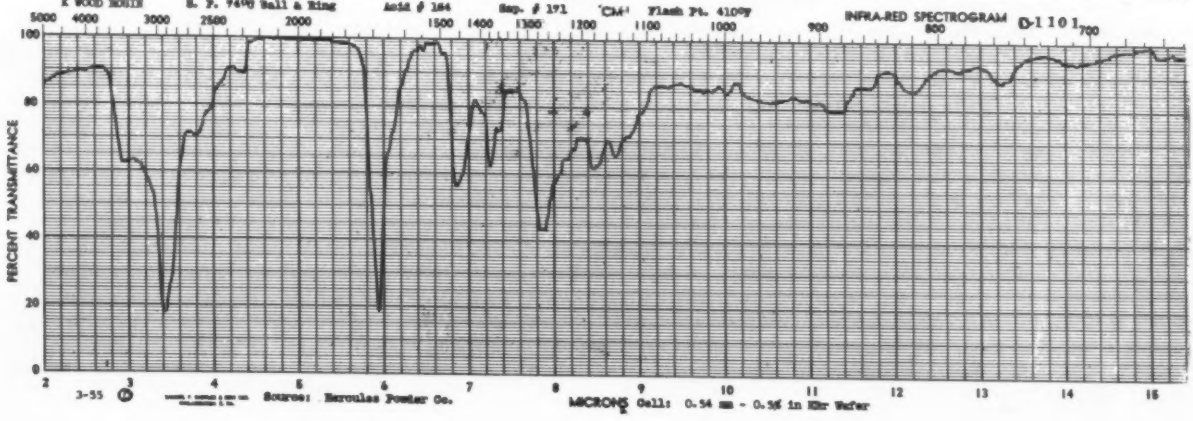
PLEXIGLAS VM-100 MOLDING POWDER COLORLESS PELLETS POLY(METHYL METHACRYLATE)



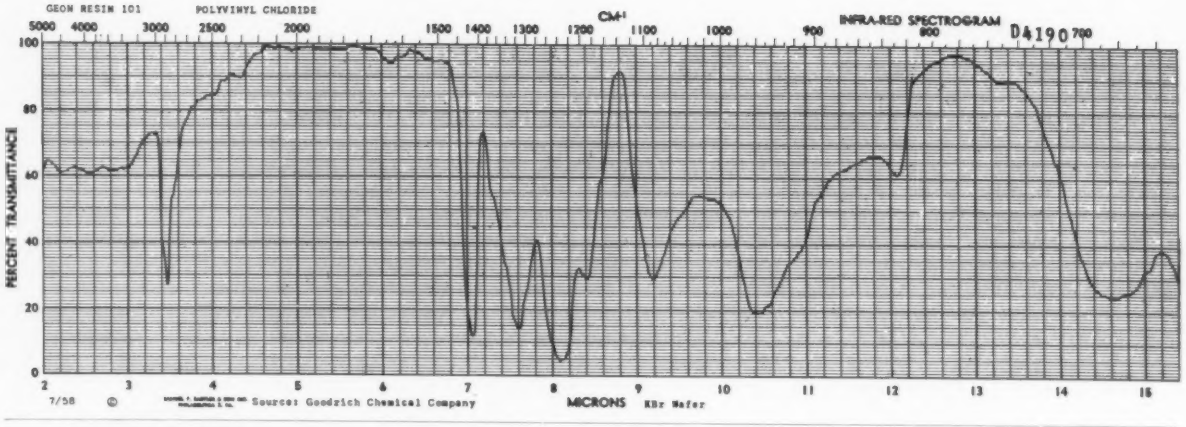
ETHYL CELLULOSE D-50 Visc. 41 cps. Ethoxyl 44.4%



K WOOD ROSIN S. P. 76°C Ball & Ring Acid # 164 Sap. # 171 CM-1 Flash Pt. 410°F

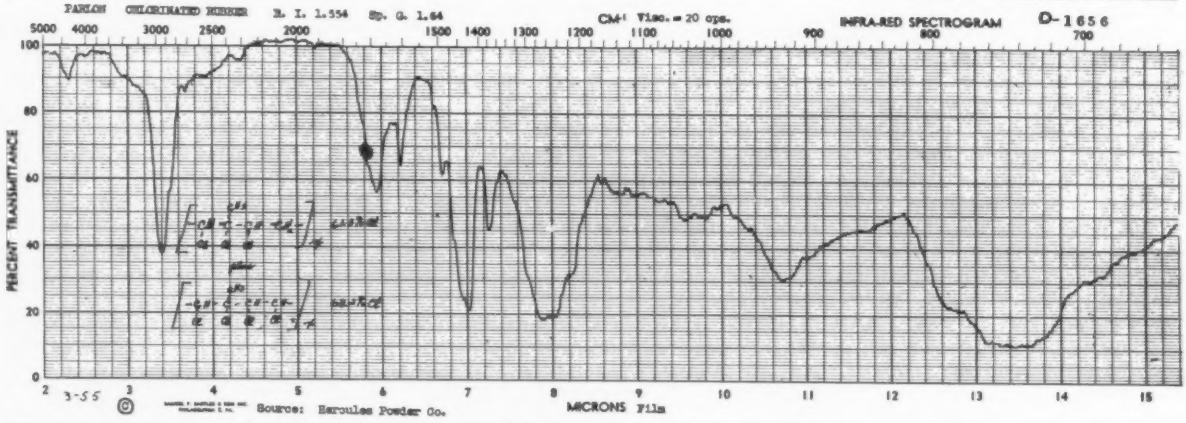


GEON RESIN 101 POLYVINYL CHLORIDE



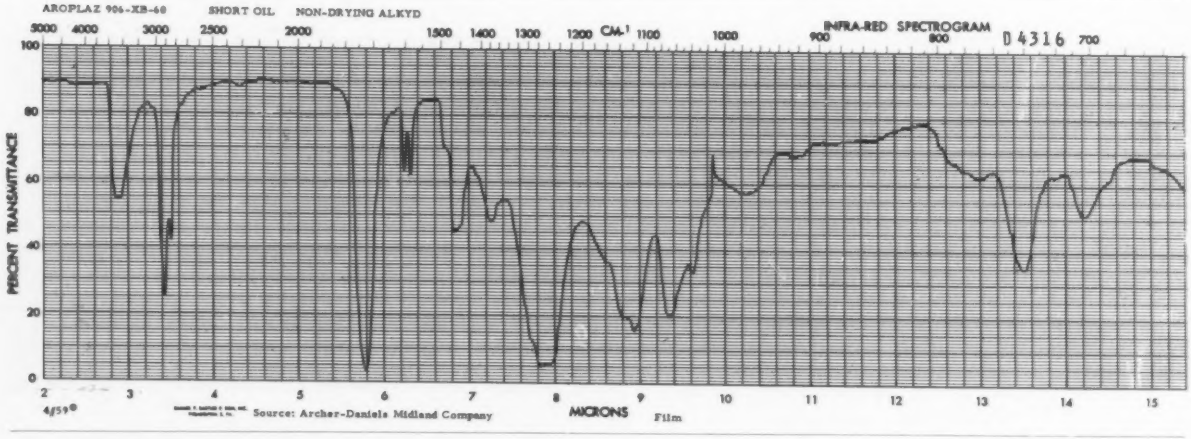
7/58 © Source: Goodrich Chemical Company

PARLON CHLORINATED RUBBER R. I. 1.554 Sp. G. 1.64 Visc. = 20 cps.



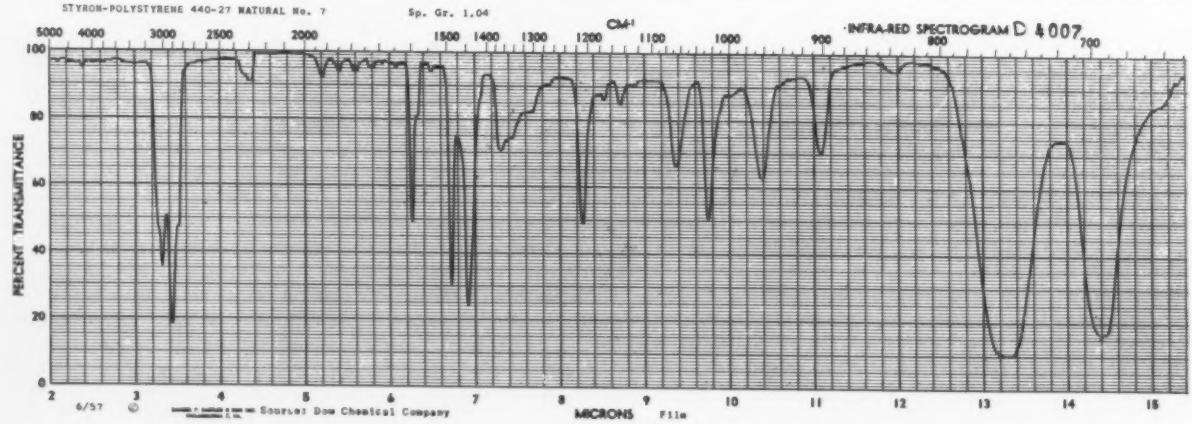
3-55 © Source: Hercules Powder Co.

AROPLAZ 906-XB-60 SHORT OIL NON-DRYING ALKYD

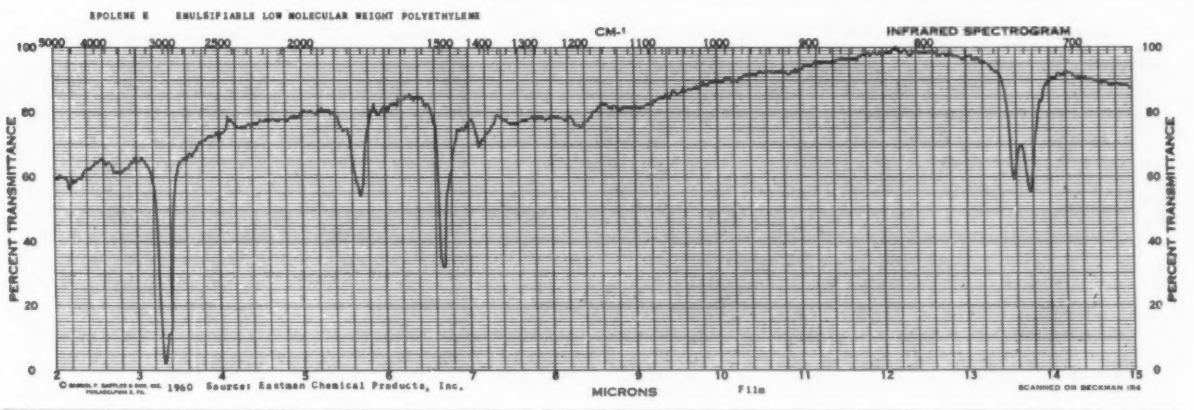


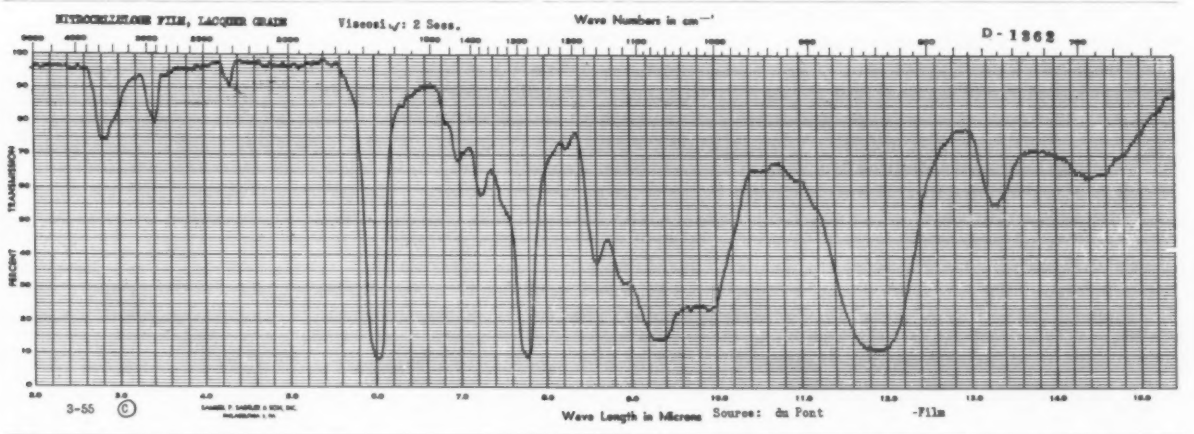
4/59© Source: Archer-Daniels Midland Company

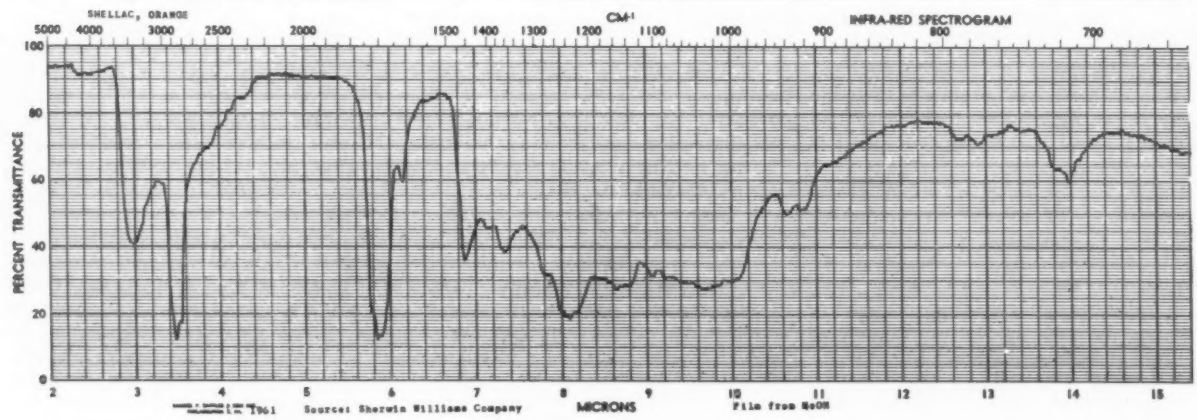
STYRON-POLYSTYRENE 440-27 NATURAL No. 7 Sp. Gr. 1.04



6/57 © Source: Dow Chemical Company



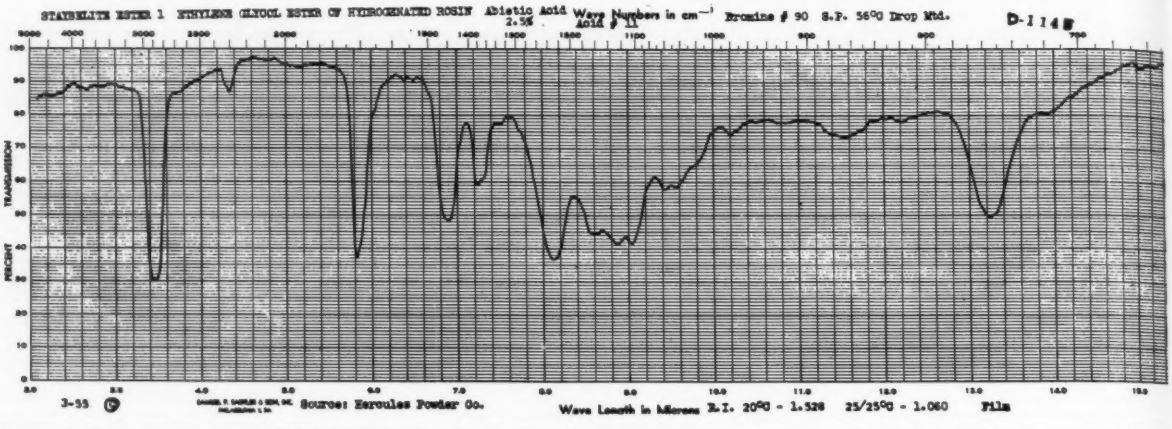


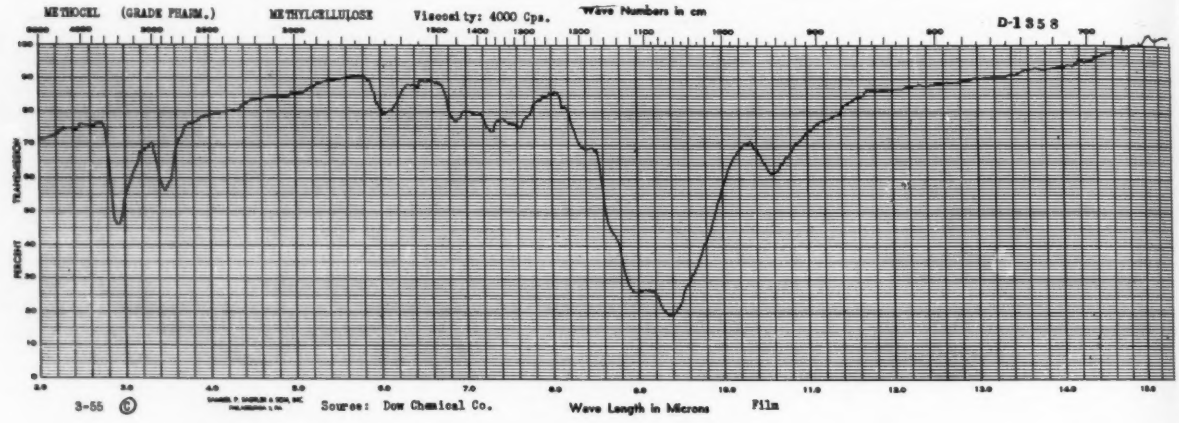


The Beilstein Test for chloride is usually strongly positive for polyvinyl chloride and rubber hydrochloride. It should be noted, however, that this is a sensitive test and traces from the trichloroethylene will give a positive result even though the resinous material is not chlorinated. For this reason a weak positive must be ignored.

GROUP 2 — ETHANOL EXTRACTS——This group will usually be heavily contaminated with organic sodium salts and soap, and if nylon or cellulose acetate is present, with low molecular weight fiber substance as well. It is recommended that a pure anhydrous alcohol be used for extracting a material containing fibrous cellulose acetate, and that the fiber be completely dried. This will cut down the amount of cellulose acetate extracted. The films laid down with this extract are usually poor, and solvent separation into the various constituents is advisable, if a significant weight of extract is obtained. Many different nonfilm formers may be found in this extract, and the effectiveness of separation can be followed by infrared spectra and weight checks. Infrared readily distinguishes the separated film formers.

10) cellulose nitrate
11) shellac
12) rosin derivatives
13) methyl cellulose
14) alkyds (may be soft and sticky)


STABELITE ESTER 1 ETHYLENE GLYCOL ESTER OF HYDROGENATED ROSIN Abietic Acid 2.5% Wave Numbers in cm⁻¹ Bromine # 90 S.P. 56°C Drop Mtd.
D-1148
PERCENT TRANSMISSION
3-55
Source: Hercules Powder Co.
Wave Length in Microns R.I. 20°C - 1.526 25/25°C - 1.060 Film


METHOCEL (GRADE PHARM.) METHYLCELLULOSE Viscosity: 4000 Cps. Wave Numbers in cm
D-1358
PERCENT TRANSMISSION
3-55
Source: Dow Chemical Co.
Wave Length in Microns Film

Confirmatory Tests. The Liebermann-Storch test is helpful with this group as well.

10) Cellulose nitrate evolves NO_2
11) Negative to a weak green color
12) Red, violet, green, brown and black
13) Yellow to greenish-brown
14) Brown

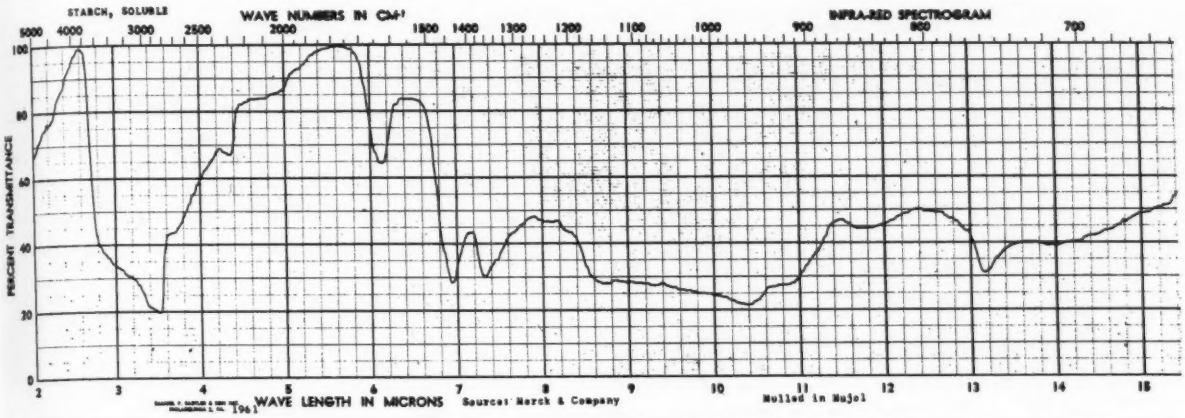
Cellulose nitrate gives a positive diphenylamine test, a blue color of great intensity which is formed when a drop of 90% sulfuric acid containing a small amount of diphenylamine is dropped onto a small fragment of the film former. This is an extremely sensitive test.

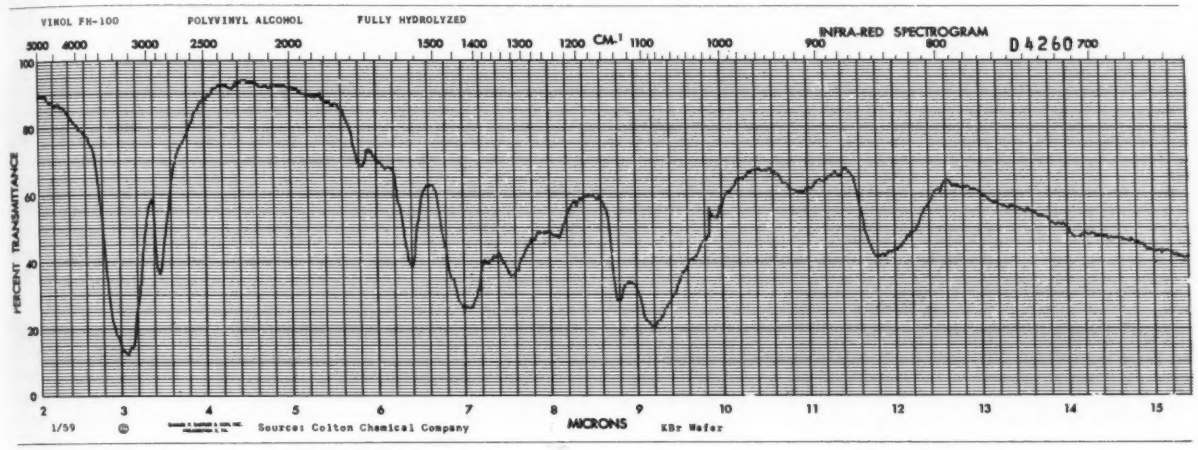
Alkyds may be tested for phthalates by mixing the resin with two to three times its weight of phenol and one drop of concentrated sulfuric acid, warming to melt into an orange-brown color; the mass is cooled, a few drops of distilled water added, and then neutralized with a few drops of 10% aqueous sodium hydroxide. A phenolphthalein red is positive for the presence of the phthalate in the alkyd.

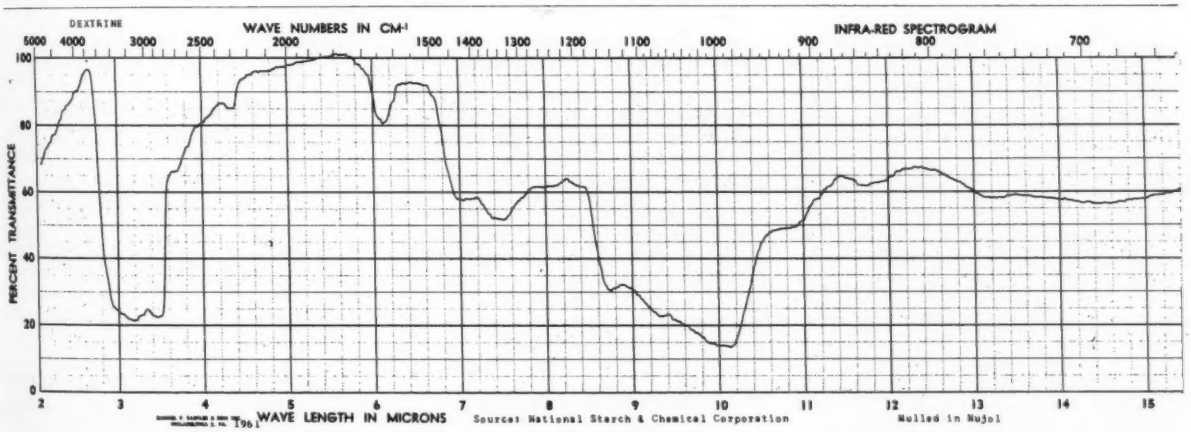
A confirmatory check for methyl cellulose is the fact that it is more soluble cold than hot in water, and if the water solution of the film former is warmed, the viscosity goes up as temperature is increased.

GROUP 3—ACETONE EXTRACT ——This extract, in addition to clearing out some resins which have been previously noted, such as alkyds, chlorinated rubber, cellulose nitrate, and polyvinyl chloride, also removes cellulose acetate. It is generally small, except where celluose acetate is present, and is mainly required so as to eliminate interference in the next extraction. Infrared spectra give a clear picture of the cellulose acetate. The lanthanum nitrate test is sometimes appropriate at this stage.

GROUP 4—WATER EXTRACT ——This group is usually contaminated with inorganic salts, but the major film formers are generally determinable without separation from contaminants. The extract can be checked for starch and similar carbohydrate-type materials with 0.1N iodine solution, giving the blue to red to brown shades according to the state of modification. Protein gives a xanthoproteic yellow with concentrated nitric acid, and neutralizing with ammonium hydroxide gives an orange shade. Formaldehyde may be present in both cases, and should be tested with a blank, as contamination and false positives are more likely than false negatives. A piece of the dried extract, two drops of a 3:2 v:v solution of concentrated sulfuric acid in water, and a speck of chromotropic acid are heated in a micro-test tube in water at 65°C for 10 minutes. A bright violet color is a positive test, but it may not appear for about one hour. Note that infrared spectra can usually give only a rough separation of this Group 4 extract. Furthermore, distinguishing between the various carbohydrates (natural gums, starches) or the natural proteins is usually a research-type problem, and no inexpensive routine procedure can be given which will furnish accurate answers. Standard tests in this field have been found misleading when checked







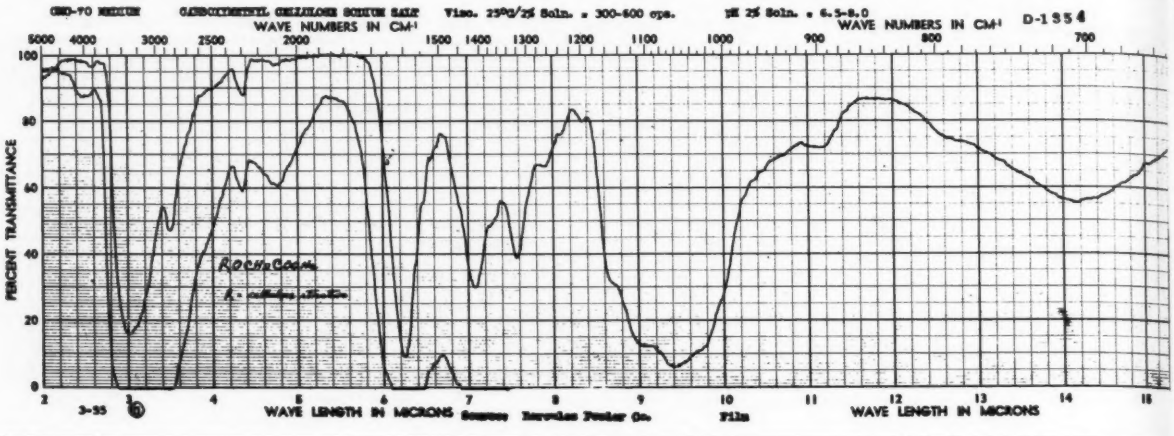
against known samples. Concentration-viscosity comparisons may be be helpful in deciding on the type of gum present.

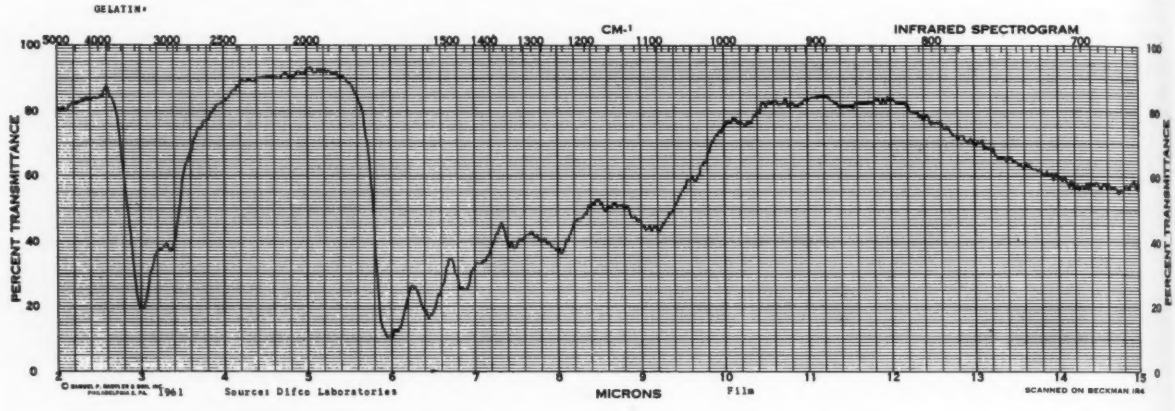
15) starch
16) polyvinyl alcohol
17) dextrin
18) carboxymethyl cellulose
19) gelatin

GROUP 5—ACID EXTRACT—— This group is likely to be covered in Category 4, Wrinkle Resisting. However, both carbohydrate and protein film formers may come out in significant quantity with this extraction. Infrared spectra are usually of no help.

GROUP 6—UNREMOVED SIZES ——Certain materials will still remain on the textile after the normal sequence of extractions. These may be checked by cross-dyeing, if for example albumen is denatured on cotton, gelatin is insoluble and set on acetate rayon, or polyacrylic acid is set into nylon. These conditions will often show as warp streaks.

Certain synthetic polymers and natural rubbers will not be removed. Techniques such as enzymatic hydrolysis, oxidative, alkali or acid attack or even fiber removal to leave the finish residue may be appropriate. Silicones, some polyamides, viscose, nitrile latices, chloroprene rubber and vulcanized rubber are materials of this sort. Checks for silicone, ni-





trogen and sulfur are generally appropriate. The silicone is already covered in Category 11. The presence of nitrogen and sulfur can be readily checked by a sodium fusion, and a test of the fusion extract after filtration with ferric salts, which will develop dark Prussian blue if nitrogen has been present, and a blackish color with lead acetate or a bright silver coin if sulfur is present. Of course it should be remembered that nylon will yield a test for nitrogen, and that wool will yield a test for sulfur. Infrared spectra will generally be useful, but a larger library of spectra is called for. NRL Report 4369-PB111438, "Infrared Spectra of Plastics and Resins" by E Kagarise and L A Weinberger, and Form FD36-554 MPL, Perkin Elmer Corporation—"Analysis of Polymers by Infra Red Spectroscopy" by H H Hansdorff, are a good beginning.

ACKNOWLEDGMENT

The spectra shown here are furnished through the courtesy of Philip Sadtler and the Sadtler Research Laboratories in Philadelphia, which undoubtedly has one of the largest collections of commercial material infrared spectra in the world.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks may be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

61-8
Education: Fairleigh Dickinson Univ, International Correspondence Graduate School.
Position desired: Textile colorist or technical service rep to printing trade.
Location: Metropolitan area or New England.
Age: 40; married; excellent references.
4-17, 5-1

61-9
Education: BS, Clemson College.
Position desired: Sales.
Location: South.
Age: 31; married; references
4-17, 5-1

61-10
Education: BS, Bradford Durfee College of Technology; Army specialized training, Univ of Massachusetts; Boston University—business law.
Position desired: Technical sales.
Location: Southeast or New England.
Age: 33; married; excellent references.
4-17, 5-1

61-11
Education: BS, textile chemistry; US Navy officer.
Position desired: Textile chemist; application and development of textiles and related products.
Location: Northeast preferred; no limitations.
Age: 24; married, one dependent; excellent references.
5-1, 5-15

61-12
Education: BS degree.
Position desired: Textile chemist, colorist and/or lab supervisor.
Location: Anywhere in the US.
Age: 47; married; references.
5-1, 5-15

61-13
Education: BS, Lowell Technological Institute.
Position desired: Technical sales and service or chemical development.
Location: Mid-West, West desired; South, Northeast acceptable.
Age: 23; single; excellent references and resume.
5-1, 5-15

1960 Convention———

RECENT DEVELOPMENTS IN THE DYEING OF VEREL† MODACRYLIC FIBER*

R J FORTUNE and V G PAUL

Dyeing and Finishing Laboratory
Tennessee Eastman Co
Division of Eastman Kodak Co
Kingsport, Tenn

One of the hazards of processing many of the man-made fibers is their sensitivity to stretch and distortion at the high temperatures commonly used in the application of dyes. Verel modacrylic fiber was numbered in this group until recent months when it was learned that, because of unusual properties of the fiber and newly developed techniques, dyes could be applied at temperatures lower than those at which distortion primarily occurs. Recent developments permit the application of disperse, neutral-premetallized, and basic or cationic dyes at 160°F. Dyeings at 160°F yield equivalent fastness properties to those made at 212°F.

Using this new technique in rawstock dyeing, loose and fluffy dyed fiber is obtained. This affords easier rinsing, opening, drying, and processing.

By lowering the dyeing temperature, new areas of fabric development are opened permitting many new styling advances. Probably one of the most important areas developed by this low-temperature dyeing technique is in the piece dyeing of tufted or woven floor coverings. Pile distortion has been a major obstacle in the piece dyeing of carpeting and one which has prevented any widespread application for the newer fibers. By dyeing at 160°F, distortion and directional lay of the pile is virtually eliminated. A complete range of shades with acceptable colorfastness may be produced. Verel fiber can be dyed equally well in packages, skeins, and fabrics by use of this new technique which results in greater retention of original fiber properties.

INTRODUCTION

DYEING at high temperatures has presented one of the major difficulties in processing many of the newer man-made fibers due to their sensitivity to packing and distortion under such conditions. Verel, Eastman's modacrylic fiber, with its many other desirable properties, must be counted in this group. When this fiber was first introduced on the commercial market, the standard, best known methods of applying dyes were employed using a dyeing temperature of 212°F. Excellent dye exhaustion and fastness properties were achieved. The superior dyeability of this fiber was readily noted; however, at elevated dyeing temperatures two serious problems were apparent.

The first problem was delustering of the fiber. This phenomenon, which occurs with most modacrylic fibers, was characterized by a chalk-like opaqueness, similar to that of dull fiber. This delustered fiber tended to lose its desirable hand and felt sticky or had excessive drag. It was essential, therefore, that the fiber be fully relustered in order to regain its true shade and physical properties.

The delustering was found to be a reversible process. When the fiber was subjected to wet heat, low-pressure steam, treatment with select salt solutions, or a combination of these treatments, relustering was accomplished.

The second problem was the excessively hard-packed dyed fiber mass. Dyeing in rawstock form resulted in troublesome shade control, nonuniformity of color, and difficult penetration of relustering salt and finishes. After dyeing and relustering were completed, more than normal time was required in washing and rinsing. Masses of unopened fiber were difficult to dry thoroughly. Drying had to be done at high temperatures. The processing of the fiber sometimes resulted in broken, distorted filaments. False crimp was put into the fiber.

With these formidable obstacles, the need for a more practical method of dyeing was essential. After months of extensive development work in the laboratory, the pilot plant, and mill trials, the realization of our goal was accomplished. It was learned that the unusual, inherent properties of Verel fiber made it possible to apply dyes at temperatures lower than at which plastic deformation occurs. These oustanding results are demonstrated by the use of AATCC testing procedures, color slides, photomicrographs, and about two years of successful mill-production experience.

DISCUSSION

RAWSTOCK DYEING———It was found that selected disperse, neutral-premetallized, and basic or cationic dyes could be applied as low as 160°F using Verel Fiber Dyeing Assistant** in amounts of 1-6% owf to dye Verel rawstock. No apparent differences were detected in the amounts of dye required, in length of dye cycle, in degree of penetration, and in general economics. Little or no change was necessary in existing formulas used in the dyehouse.

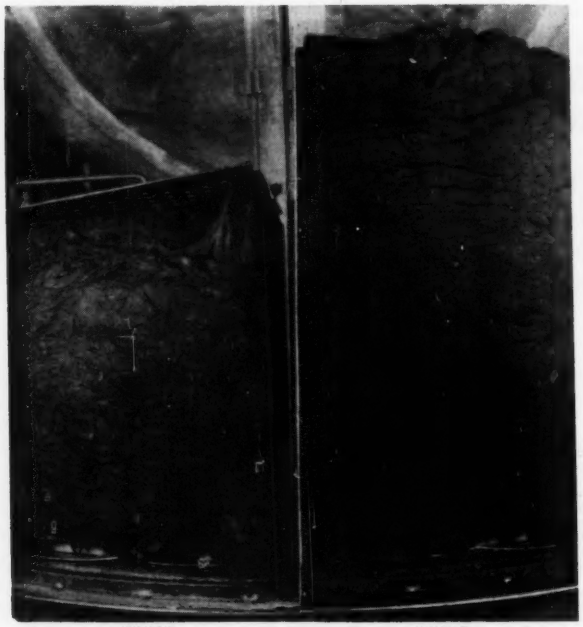
A comparison of dyeings made at 160°F and 212°F is shown in Figures 1 and 2. It can be readily seen that the fiber cake which was dyed at 160°F is noticeably greater in height than that dyed at 212°F. The fiber dyed at 160°F is quite loose and fluffy in texture. This result is important in relation to subsequent dyehouse processing for the following reasons:

1) Complete dye levelness with thorough penetration of dye additions through the fiber mass.
2) Elimination of relustering salt and relustering cycle.
3) Shortened dye cycle.
4) Thorough washing and rinsing in a minimum of time.
5) Easy opening of the dyed fiber prior to extraction.
6) Complete drying in a shorter time and at a lower temperature since the fibers are held to each other quite loosely.
7) Fiber processing facilitated with few or no broken and distorted filaments.
8) More retention of original fiber properties, such as crimp level.

Penetration of dye into the fiber is an important factor governing color-

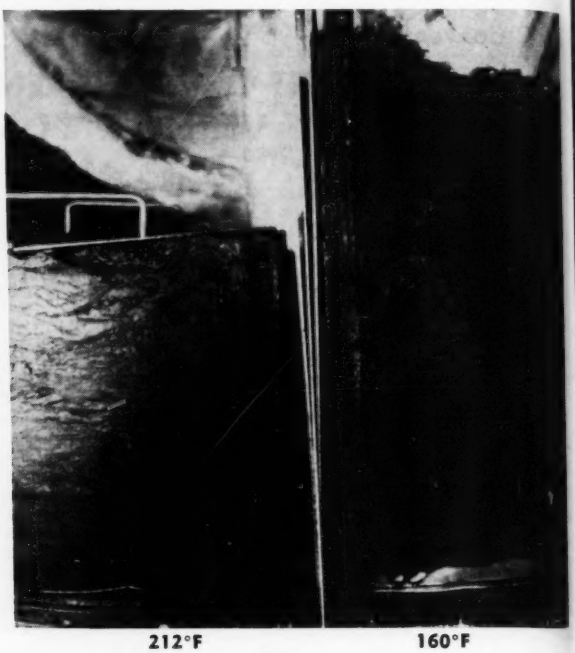
*Presented October 8, 1960 at the Sheraton Hotel, Philadelphia, Pa.
†Verel is Eastman Kodak Company's trademark for modacrylic fiber.

**Verel Fiber Dyeing Assistant, distributed by Eastman Chemical Products, Inc, is an organic phosphate containing self-emulsifying chemicals.



212°F 160°F

Figure 1
Comparison of 3D/F Verel fiber in rawstock dyeing



212°F 160°F

Figure 2
Comparison of 16 D/F Verel fiber in rawstock dyeing

fastness. The photomicrographs in Figure 3 illustrate the penetration of the dye in Verel fibers dyed at 160°F and 212°F. Fiber dyed at 160°F is penetrated as well as that dyed at 212°F.

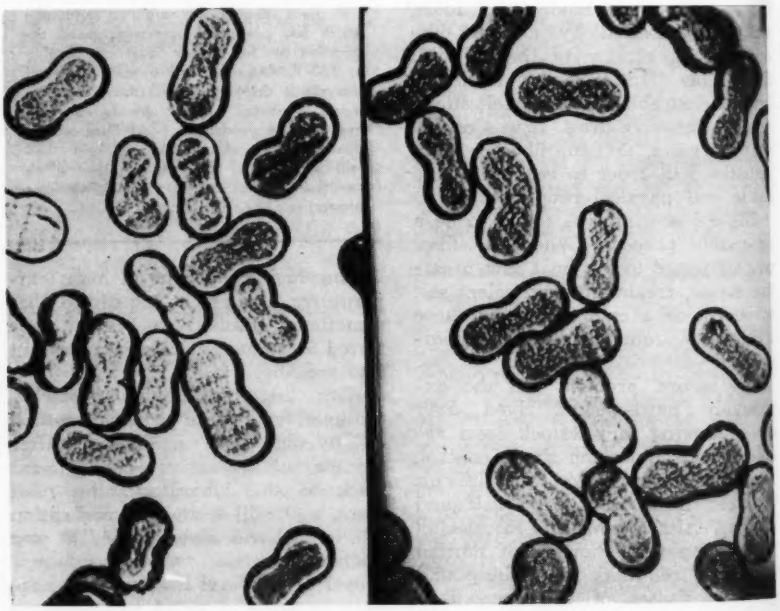
CARPET PIECE DYEING——With the development of the low-temperature-dyeing technique, new and enlarged areas of fabric development have been opened. It is now possible to piece dye tufted and woven floor coverings of Verel fiber with ease and achieve outstanding results.

A complete range of shades, ease of introducing new shades, minimum inventory, faster delivery, and economical custom dyeing are some of the practical advantages presented to the carpet producers through piece dyeing.

Dyeing of floor coverings in piece form has never been widely employed with acrylic and modacrylic fibers for a number of reasons. To obtain adequate penetration of the dye into the fiber, it was necessary to dye at the boil or even under pressure for extended periods of time. When these conditions were used the pile became distorted, crushed, cracked, and matted. Problems were also encountered with shading.

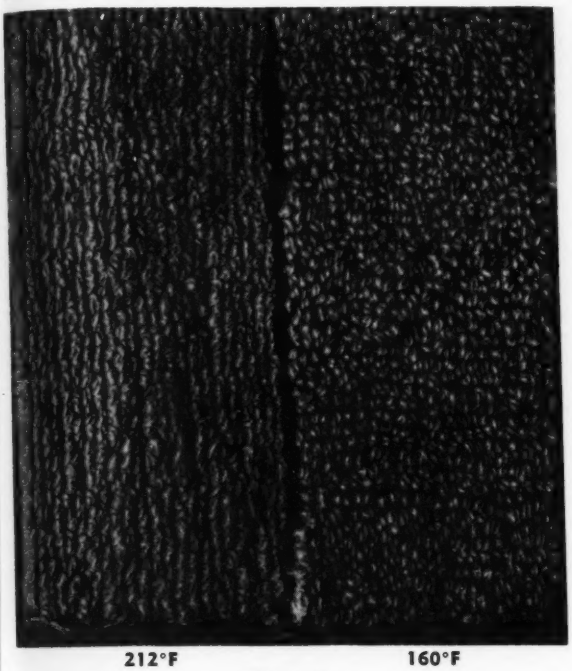
Taking advantage of the exceptional dyeability of Verel fiber at 160°F, dyeings were made on a laboratory dyebeck with small carpet samples. Pilot plant and mill trials followed while increasing carpet widths to twelve and fifteen feet. The results verified the laboratory experiments. Examination of the dyed carpets revealed freedom from cracks and crushing, with no distortion of the pile, and no side-to-side or side-to-center shading.

Verel carpets, like those made of



212°F 1250X C-8334 160°F 1250X C-8333

Figure 3
Cross-sectional photomicrographs of stock-dyed Verel fibers



212°F 160°F

Figure 4
Piece-dyed Verel carpets of identical construction

212°F 160°F

Figure 5
Side view of piece-dyed Verel carpets of identical construction

other acrylic and modacrylic fibers, have the characteristic of becoming soft and losing resilience when exposed to temperatures ranging from 200°F to 300°F. As a result, the pile tends to "iron", or assume a directional lay, when passed face down over hot rollers, such as may be encountered in high-temperature drying or in latex curing. Two successful methods have been used to cope with this problem. First, the carpet is passed through the dryer or latex curing oven at normal temperatures and speeds. If the pile becomes flattened, it may be erected by beating while the fiber is hot. Once the pile has cooled in an upright position, it will remain permanently erect. Second, the dryer temperature is lowered to 180°F and the speed is reduced in order to obtain complete drying of the latex. A face-up oven, in which the pile does not come in contact with hot rollers, is ideal for finishing Verel carpets. Here, too, the carpet should be allowed to cool below 180°F before being rolled up.

Figures 4 and 5, which show Verel carpets of identical construction dyed at the boil and at 160°F, illustrate the texture and quality that can be achieved in dyeing at 160°F. The ability of Verel to be piece dyed in carpet form gives it a significant advantage which few, if any, of the acrylic and modacrylic fibers enjoy.

PACKAGE DYEING———Another important method of dyeing is in package form for such fabrics as plaids, checks, and other fancies. It also has use in carpet styling when small inventories are necessary to complete a range of shades in a color line. The ability of Verel fiber to be packaged dyed increases the number of dyehouses in which it can be wet processed since few plants are equipped to dye fiber in all forms.

When a temperature of 212°F was employed in package dyeing Verel fiber, the yarn sagged away from the dye tube, appeared lean in texture, and required high drying temperatures to reluster.

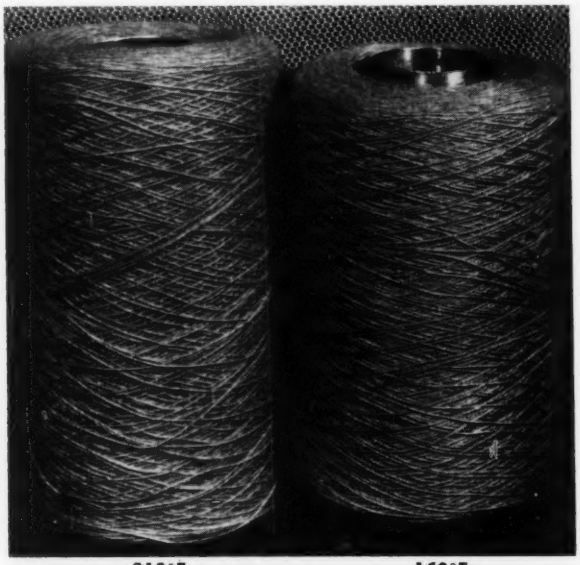
Using the same low-temperature-dyeing technique previously described, excellent results are obtained. Packages of Verel yarn dyed at 160°F were firm and undistorted, and could be fully relustered at drying temperatures as low as 200°F. The yarn retained its bulky texture and did not sag away from the dye tube. Comparative results of package dyeings of Verel yarns made at 160°F and 212°F are shown in Figure 6.

SKEIN DYEING———There are important uses for skein dyeing in the textile trade. Many of the carpet yarns being used today are dyed in this form. It permits large or small lots to be handled with minimum fiber waste, smaller inventories of dyed yarn, and good texture of finished yarn. Skein dyeing of carpet fibers is not as widely used as raw-stock dyeing because of distortion, crushing, or cockling of the yarn, unlevel dyeing, comparatively small lot sizes, and general economics.

When skein dyeing of Verel carpet yarns at 212°F was attempted, most of these problems occurred. Using the 160°F dyeing technique, many of these difficulties were overcome, namely, freedom from cockling and crushing with no plastic deformation. The texture of the yarn was excellent as illustrated by the direct comparison of Verel skeins dyed at 212°F and 160°F in Figure 7. While good progress has been made in skein dyeing Verel yarns, dye unlevelness has not been completely eliminated.

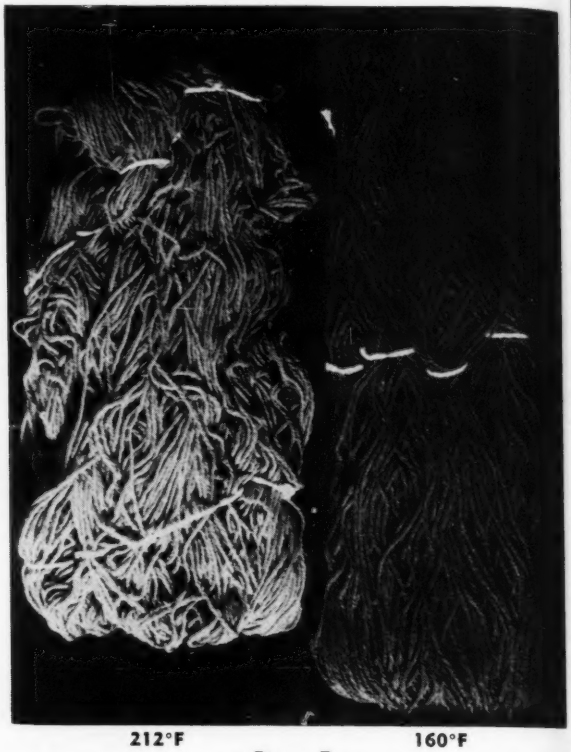
PIECE DYEING———A large percentage of all fibers is dyed in fabric form. Piece dyeing is more economical and provides more versatility in the extensive area of 100% constructions and in blended fabrics.

When woven or knitted piece goods of Verel fiber were dyed at 212°F, creasing distortion, and loss of original fabric texture were encountered. For example, dyeing of velour fabrics of Verel at the boil crushed the pile to the extent that no amount of finishing ingenuity could restore it.



212°F 160°F

Figure 6
Comparison of Verel fiber in package dyeing



212°F 160°F

Figure 7
Comparison of Verel fiber in skein dyeing

By applying the 160°F dyeing technique and controlling the rate of temperature rise as well as the dyebath components, these fabrics dyed level and finished with excellent general appearance.

Piece goods of Verel, such as drapery, upholstery, work clothing, knit goods, and other apparel fabrics, can now be successfully wet processed, free of creases and distortion, and will retain or develop the desired fabric texture.

SUMMARY

A practical approach to the problems of thermoplastic deformation and delustering in dyeing and finishing has been established with Verel modacrylic fiber. This is result of an extensive development program substantiated by over two years of practical mill production. A unique, inherent property of Verel fiber allows it to be dyed very readily at 160°F using Verel Fiber Dyeing Assistant. A complete range of shades is obtainable with selected disperse, neutral-premetallized, and basic dyes. This is accomplished with no differences in fastness properties, amounts of dye required, length of dye cycle, degree of dye penetration, and in general economics when compared with similar dyeings made at 212°F.

In raw stock dyeing, the loose fluffy cakes simplify dyehouse handling by allowing easier rinsing, opening, drying, and processing.

In package dyeing, a firm, undistorted package is obtained. The yarn is bulky in appearance and does not sag away from the dye tube.

In skein dyeing, excellent texture is obtained without creasing of individual yarns.

In piece dyeing, the development of a desirable texture makes it possible to use Verel fiber in tufted and woven floor coverings. Draperies, velours, upholstery, apparel, and tubular knit fabrics are free of creasing and distortion.

Verel fiber, possessing the desirable characteristics of competitive acrylic fibers plus fire retardancy, higher moisture regain, superior dyeability, and excellent chemical resistance, has been firmly established in the textile trade especially in floor coverings, pile fabrics, draperies, and apparel.

Fabric designers have seen the advantage of acrylic and modacrylic fibers for many additional consumer uses, but have been hampered because of stretch and distortion in hot, wet, and dry textile processing.

Armed with the most recent knowledge of the versatility of Verel fiber and unhampered by undesirable thermoplastic deformation, the designer has at his command a new frontier potentially laden with an unlimited number of consumer products.

ACKNOWLEDGMENT

We wish to take this opportunity to thank the many people at Tennessee Eastman Co and participating mills for their work, cooperation, and encouragement.

Also, we wish to thank W R Ivey, chief chemist, Dyeing and Finishing Laboratory, Tennessee Eastman Co, for his helpful suggestions together with private communications and guidance.

Finally, we wish to thank D G Carmichael, chief consulting chemist, Eastman Chemical Products, Inc, who provided much unpublished data in low-temperature-dyeing techniques and was always helpful in many difficult technical problems.

AUTHORS' NOTE

The information in this paper is accurate to the best of our knowledge. Tennessee Eastman Co, Division of Eastman Kodak Co, must necessarily disclaim responsibility for all results and use of products and methods mentioned herein, since the conditions of use cannot be controlled. No statement in this paper is to be considered a recommendation of any use, manufacture or sale that may infringe any patents now or hereafter in effect.

1960 Convention———

NEW FIBERS FROM DU PONT*

M M CHRISTIE
E I du Pont de Nemours & Co, Inc
Wilmington Del,

New fibers with unique characteristics provide an ever-expanding base for the development of fabrics with new style, aesthetics and performance. For a number of years, Du Pont has devoted major research efforts to evolving a more comprehensive family of fibers to meet the needs of the industry. A number of new fibers recently introduced includes:

Orlon Type 72 acrylic fiber for the cotton system
Orlon Sayelle bicomponent acrylic fiber
Antron trilobal nylon
Dacron Type 62 polyester fiber
Lycra Spandex fiber.

In fabrics, these represent a wide variety of types and end-use areas. The outstanding features of these fibers as well as some of their physical properties which can be translated into desirable fabric characteristics are discussed.

INTRODUCTION

NEW fibers with unique characteristics provide an ever-expanding base for the development of fabrics with new style, aesthetics and performance. Since nylon was first introduced by Du Pont in 1939, primary emphasis has been given to establishing and improving the performance and aesthetic properties of the Company's fibers. This has been true not only for nylon but also for Orlon acrylic, Dacron polyester, and the other fibers. In addition to a program for continued improvement of its existing product lines, Du Pont has, for a number of years, devoted major research efforts to developing a more comprehensive family of fibers to meet the needs of the textile industry. New attention has been focused on the development of fibers which offer the fabric designer an opportunity to develop a broader range of styled fabrics.

I would like to review for you a number of these new fibers with special emphasis on their outstanding features as well as some of their physical properties which can be translated into desirable and unique fabric characteristics. These fibers are:

a) Orlon Type 72
b) Orlon Sayelle
c) Antron nylon
d) Dacron Type 62
e) Lycra spandex fiber

In fabrics these represent a wide variety of types and end use areas.

DISCUSSION

ORLON TYPE 72———The latest member of Du Pont's cotton-system-type family of Orlon acrylic fibers is Orlon Type 72. This product is designed as a staple for blending with cotton. The outstanding features of Type 72 are its whiteness and its next-to-the-skin comfort. It has the durable whiteness and brightness of bleached and brightened cotton. Consequently it does not need the chlorine-type bleach normally used on Orlon Type 42 staple. In fact, in 100 percent fabrics it need not be bleached at all. When Orlon Type 72 is blended with cotton, the cotton must be bleached. Accordingly, cotton procedures have been worked out for this blend. During use, whiteness of Type 72 is retained. In fact, laboratory tests have shown that its good whiteness and brightness is retained even after 20 launderings.

Fabrics containing Orlon Type 72 can be engineered to be cool in summer and warm in winter. Special tests conducted under warm-weather controlled temperatures and humidities have shown that fiber denier per filament is an important factor in the comfort of Orlon acrylic fibers. Orlon Type 72 is produced as 1.5 denier per filament fiber in order to increase fabric comfort properties. Results of comparative tests with both knit and woven fabrics show that Orlon Type 72 possesses unique comfort properties. In winter, it is warm because of its bulk and insulating properties. Under warm-moist conditions, it is cool because of the large surface area available for the removal of moisture from the skin by the low denier per filament Orlon fibers. This moisture is spread over this surface area, wicking the moisture quickly away from the skin. Since lightweight clothing is worn under these conditions, this moisture is evaporated rapidly, leaving the skin cool.

Currently, Du Pont's effort with this particular type Orlon is being devoted to the development of fabrics for garments such as T-shirts, shorts, sport shirts, pajamas and underwear for men's, boys' and children's wear, where comfort and next-to-the-skin wear are considered among the important consumer requirements.

ORLON SAYELLE ——— Orlon Sayelle represents Du Pont's newest Orlon acrylic fiber in the luxury or prestige family. This product is a bicomponent acrylic fiber and is an excellent example of the creation of a new basic fiber type. The cross section is nonround and when stained shows a bilateral structure similar to that of wool. When compared with other man-made fibers, Orlon Sayelle is not conventional, but is a two-component structure with the components fused together along their contact faces during spinning. These components differ in molecular structure; therefore, their response to external conditions is different. Just as a thermostat reacts to surrounding temperature changes, this fiber reacts to heat treatment and develops a three-dimensional crimp. It is important to recognize that upon wetting and drying, this crimp reaction is reversible. As the fiber dries, crimp increases and upon wetting, it decreases. Characteristically, these elements respond to the general range of hot, wet conditions encountered in commercial dyeing and finishing.

The fiber feature of permanent reversible cork screw crimp long has been recognized as unique and one of the most important properties in the development of certain tactile properties in fabrics. As you know, earlier researchers revealed this to be a key property of wool.

The crimp developed by fibers of Orlon Sayelle is somewhat similar to that of wool.

In knitwear, Orlon Sayelle has made possible the development of a new range of styled fabrics heretofore not possible with regular Orlon or other man-made fibers. Efforts are being directed to expanding this technology to woven fabrics. The

*Presented October 8, 1960 at the Sheraton Hotel, Philadelphia, Pa.

outstanding contribution of Orlon Sayelle is an improvement in aesthetics with fabrics being more wool-like, exhibiting more bite and compressional resilience than is noted with other acrylic fibers. With this new product, yarn bulk and loft is not dependent on high-low shrink processing and blending. This is illustrated in a comparison of "as-spun, with boiled-off" yarns. The second important characteristic imparted by this fiber is fabric elasticity. There is a degree of elasticity developed in yarns of Orlon Sayelle which has heretofore been an attribute associated with certain animal fibers. In a practical sense, this is best exemplified in hand knitting yarns, sweater bands, and other knit structures.

As you would expect, the finishing of fabrics of Orlon Sayelle is keyed to the development of the random spiral crimp of the individual fibers. To activate this built-in crimp potential, fabrics or fibers should be wet treated at some point for at least 15 minutes at a temperature of 208°F or higher. Relaxed drying is then the key step to developing the full crimp. Uniformity of drying conditions, particularly tension, which should be kept at a minimum, is essential to obtaining uniformly good fabric relaxation, bulking and elasticity. Goods that are tumble dried are free to relax completely; therefore they are more bulky than those dried under tension. Though the drying temperature has little effect on crimp development, air drying of fabrics should be conducted to reduce excessive stress or compression that may cause distortion.

In woven fabrics, animal (in contrast to man-made) fibers substantially recover crimp lost to tensions in yarn and fabric processing, but man-made fibers generally do not. With Orlon Sayelle, recovery does occur through a live memory-like action in fabric finishing. The result is an improvement in aesthetics and performance. Orlon Sayelle, therefore, provides a new degree of freedom in the design and finishing of aesthetically pleasing fabrics from the growing family of Orlon acrylic fibers. Samples developed for the introduction of this product into the prestige market look very promising.

Moving along, let's take a look at another area of fiber research that has resulted in two other new products. Fiber cross-section modification is the new dimension for Antron nylon and Dacron Type 62 filament yarns. More specifically, a trilobal cross-section engineered into these fibers contributes certain distinct advantages over comparable round cross-section fibers.

ANTRON NYLON———Dress fabrics of Antron nylon have a distinctive pleasant hand, a unique three-dimensional luster highlight resulting in improved surface interest and increased color brightness in dyed or printed fabrics. Of particular importance is the improved print definition which occurs from increased contrast betweeen brighter colors on the printed area and improved cover on nonprinted areas. Foundation garments benefit from the fiber's influence on hand and wicking action. Women's uniform fabrics show greater opacity or cover. Other qualities of Antron nylon such as drape, dyeability and "wash-and-wear" properties are comparable to those of regular Du Pont nylon.

A variety of taffeta and twill fabrics, both plain and printed, have been produced which exhibit varying degrees of highlight effects and which cover a range of hand and softness. In the market today, these have created interest for a wide variety of end uses. These include the development of new dresswear fabrics of 100 percent nylon, knit fabrics for men's wear from textured Antron nylon yarns and shell and fleece fabrics for outerwear, in addition to many others.

Dyeing and finishing procedures for fabrics of Antron nylon are essentially the same as those used for fabrics constructed of round filament nylon. It is possible to obtain a range of fabric crispness and hand by varying heat-setting conditions. As with any fabrics of nylon, the finisher may adjust details of the procedure to obtain the desired fabric characteristics. For some of the new fabrics being produced from Antron nylon, it is desirable to incorporate an antistatic treatment in the fabric finishing. Considerable success has been achieved using the Aston-Eponite treatment described in Du Pont's Technical Information Bulletin entitled "A Durable Antistatic Finish For Synthetic Fibers". This treatment on fabrics of Antron has proven fast to ten or more launderings and several dry-cleanings. Scrooping agents, such as Alon C, have proven useful in adjusting the hand of woven fabrics either in combination with antistatic treatment or alone.

Fabric-finishing treatments also effect the ease of sewing and the seam appearance. It is now strongly recommended that fabrics be heat set in relaxed form. Recently, a procedure has been worked out in commercial trials that has demonstrated a dramatic improvement in seam puckering and general sewing performance. The essential part of this procedure has been to heat set the fabric in completely relaxed form. This may be done in a loop dryer for one minute at 420°F. This is followed by steam framing the goods to maximum desired width.

DACRON TYPE 62———Dacron Type 62, in addition to being a modified cross-section yarn, also has been changed to make it dyeable with both disperse and basic colors. As such, it differs from regular Dacron Type 56 not only in dyeing characteristics but also in the aesthetic qualities of hand and appearance which it imparts to fabrics. This Dacron product offers that unique combination of luxurious touch, dyeability, and printability traditionally associated with silk. These new aesthetic characteristics are an addition to the functional properties inherent in fibers and yarns of Dacron.

The recommend dyeing and finishing procedures for fabrics of Dacron Type 62 have been established to achieve maximum development of fabric aesthetics, uniformity and style. Many fabric constructions of Dacron Type 62 yarn should be beck dyed rather than jig dyed. The relative lack of tension on the fabric in the beck allows the yarns in the fabric to relax and approach their individual fiber shrinkage levels. Streaks caused by configuration differences are evened out during working of the fabric in rope form. Dye penetration is much better. The net result is that these fabrics are more uniform, require fewer rehandles because of shaded goods and the aesthetics are greatly improved.

One of the finishing treatments that has shown excellent results on fabrics of Dacron Type 62 is the heat-caustic treatment. This treatment is a new process developed for improving the tactile and visual properties of fabrics of Dacron. The procedure consists of a heat-setting treatment followed by processing in a solution of caustic under carefully controlled conditions. Treated fabrics have improved liveliness, drape and covering power in addition to a warm, dry hand with increased scroop. These features greatly expand the range of aesthetics that the finisher can obtain with fabrics of Type 62.

For certain types of fabrics, calendering has been used prior to the heat-caustic treatment. Under con-

trolled conditions of temperature and pressure, calendering flattens the yarn bundle, deforms some of the individual filaments and increases the cover, and is used primarily on flat fabrics. Excellent results also have been obtained through scouring and heat-caustic processing after calendering. This combination removes fabric stiffness and etches the surface of Dacron fibers.

Dacron Type 62 offers the fabric designer greatly increased style versatility. It can be used alone, in combinations with other types of Dacron or with other fibers. The cross-dye combinations of Dacron Type 62 with regular Dacron fibers have been developed into a wide range of well-styled dress and sportswear fabrics. Constructions of 100 percent Type 62 have been utilized to achieve prints with a new richness and clarity of color. These fabrics and others currently being introduced to the market combine beauty with little change in wrinkle resistance, strength, abrasion resistance and "wash-and-wear" properties associated with Dacron.

LYCRA SPANDEX———The development of Lycra spandex fiber is an outstanding example of research with function as the key objective. For many years, Du Pont research teams worked to develop a truly elastic yarn with:

1) exceptional power on retractable force for the development of fine count lightweight fabrics,
2) good mill processibility essentially comparable to fibers such as nylon, Dacron and rayon, and
3) dyeability under regular commercial processing conditions.

Intensive research on conventional fibers—nylon, Dacron and many other polymers did not lead to this objective. None was truly satisfactory. Success finally came. Du Pont's Pioneering Research Laboratory developed a modified polyurethane material into the fiber now known as Lycra.

Lycra is a single-filament textile yarn. Even though a finer yarn, it is stronger, more durable, weighs a third less, gives longer wear and has from two to three times as much restraining power as conventional elastic yarn. As a result, foundation fabrics containing Lycra are softer, lighter, and sheerer and have the kind of elastic control generally provided by heavier, bulkier materials. Other advantages are its dyeability and resistance to perspiration, cosmetic oils and lotions. With proper controls, fabrics can be machine washed and dried with complete safety.

Another significant advantage is its inherent whiteness. The problem of off-color yarns has been eliminated. In addition "grin-through", which occurs when undyed core thread shows through stretched fabric, does not occur because both core and covering are dyed together in the piece-dye process. As you know, this is a very important factor in the development of swimwear fabrics. With this fiber, fashion colors now are easily obtainable through regular procedures of fabric dyeing. Lycra has an affinity for most classes of dyes. As is always the case, care in the selection of dyes is recommended to obtain a range of shades with acceptable fastness for most end-uses. For most fabrics, dyeing and finishing procedures similar to those used for fabrics containing rubber have been successful. During processing, minimum tensions and temperatures should be maintained to prevent changes in fabric properties. If possible, fabrics should be overfed while framing to eliminate warp tension. Chemical finishing agents, such as gums, starches, synthetic sizes, resins and softeners, can be applied to fabrics to alter the hand, improve the dimensional stability or aid in fabrication of garments. Thermosetting resins are not recommended because of high-temperature curing conditions often required.

While major development activity on Lycra has been concentrated initially on foundation garments., its potential extends to virtually every category of textiles. Based on limited trials, we expect this product to expand in areas such as swimwear, sock tops, surgical hosiery, athletic pants, snow suits and a wide variety of other end uses requiring good stretch and strain performances.

A limited supply of the following publications are available from AATCC National Headquarters, PO Box 28, Lowell, Mass:

AATCC Test Methods, Part 3, *1960 Technical Manual*, 130 pages —$2.00 per copy

List of American-made dyes, arranged alphabetically by trade name, under *Colour Index* generic names, and by prototype numbers, 130 pages—$2.00 per copy

List of textile chemical specialties, 180 pages—$2.50 per copy

AATCC EMBLEMS

YOUR membership lapel emblems, pins and tie clips are badges of distinction. Do you wear them at section meetings, national conventions, on business and social occasions?

Lapel emblems are available at $2.25 and pins at $2.50. AATCC emblem tie clasps (gold), specially boxed for gift presentation, sell for $4.00 each. All are available through National Headquarters, Box 28, Lowell, Mass.

ALL FOUR VOLUMES

OF THE SECOND EDITION

COLOUR INDEX

NOW AVAILABLE

PREPAID SUBSCRIPTION FOR THE FOUR VOLUMES IS $112.00 PER SET, PACKAGED AND DELIVERED

Your prepaid subscription received promptly will insure your possession of this LIMITED EDITION, a tremendously valuable work on the free world's dyestuffs and pigments in commercial use. Published by The Society of Dyers and Colourists and the American Association of Textile Chemists and Colorists, these four volumes totaling 3152 pages provide the only complete reference of coloring matters available to those interested in this field. They include information on methods of application and fastness properties of coloring matters furnished by world manufacturers, chemical and structural information, characteristic reaction, index of products and trade names, fastness tests and rating methods, new and old COLOUR INDEX NUMBERS, Schultz and AATCC prototype numbers and a hue indication chart.

Orders in the United States, Mexico, Central and South America (excluding British possessions) should be placed with—

American Association of Textile Chemists and Colorists
PO Box 28, Lowell, Massachusetts

Orders in other countries should be placed with—

The Society of Dyers and Colourists
19 Piccadilly, Bradford, Yorks, England

Membership Applications

March 30-April 12, 1961

NEW ENGLAND REGION

Northern New England Section

Transfer to Junior

Frances B Davis—Lab trainee, tex engr, Samson Cordage Works, Shirley, Mass. Sponsors: G J Mandikos, G P Paine.

Miriam Liang—Graduate student, teaching fellow, Northeastern Univ, Boston, Mass. Sponsors: C E Medde, G P Paine.

Rhode Island Section

Senior

Alexander R Howell—Supt, dyeing & finishing, Warner Bros Co, Ashaway Div, Ashaway, RI. Sponsors: A Hustwit, C Nathanson.

Transfer to Senior

Laurent C Renaud — Chemist, Owens Corning Fiberglas Corp, Ashton, RI. Sponsors: J J Dillon, H Rogers.

CENTRAL ATLANTIC REGION

Delaware Valley Section

Senior

Edward L Reeder—Sample dyeing, Globe Dye Works Co, Philadelphia, Pa. Sponsors: F V Traut, G J Mandikos.

Francis R Reeder — Laboratory, Globe Dye Works Co, Philadelphia, Pa. Sponsors: F V Traut, E F Martin.

Murray Steinberg—Tex chemist, Lilor Products Inc, Philadelphia, Pa. Sponsors: J S Pasquariello, W W Gleadall.

Transfer to Senior

Robert H Keenan—Salesman, Allied Chem Corp, National Aniline Div, Philadelphia, Pa. Sponsors: G J Mandikos, G P Paine.

Metropolitan Section

Senior

Lyndon B Benbow—Lyman rep, M Lowenstein & Sons Inc, New York, NY. Sponsors: J F Corbett, C H Huggins Jr.

Sheldon A Feingold—Technical editor, Interscience Publishers Inc, New York, NY. Sponsors: C E Coke, J E Lynn.

Transfer to Senior

Attilio S Aloia—Textile chemist, American Cyanamid Co, Organic Chem Div, Bound Brook, NJ. Sponsors: P B Roth, W N Nakajima.

Roy R Hamilton—Asst sales mgr, textile products, The Harshaw Chem Co, Hastings-on-Hudson, NY. Sponsors: H W Dingee, O C Bartenbach.

John W Kennette—Chemist, Air Reduction Chemical & Carbide, Bound Brook, NJ. Sponsors: W F Lehr, R H Kennette.

Niagara Frontier Section

Transfer to Junior

Donald J Delano—Chemist, National Aniline Div, Allied Chem Corp, Buffalo, NY. Sponsors: G A Altenbaumer, F J Dombik.

SOUTHERN REGION

Northern Piedmont Section

Senior

Coleman A Doss—Asst head finisher, Burlington Industries, Hurt, Va. Sponsors: E B Cook Jr, C W Singleton.

Palmetto Section

Senior

Edwin S Cox—Asst lab dir, Delta Div, J P Stevens & Co, Wallace, SC. Sponsors: W T Rutledge Jr, H G Parrish.

Samuel N Pratt—Tech rep, Interchemical Corp, Color & Chemicals Div, Rock Hill, SC. Sponsors: C S Powell, W B DePass.

Piedmont Section

Senior

John P Shaw—Package dyer, Morgan Mills Inc, Laurinburg, NC. Sponsors: J P McGinty, C E Gibson.

Transfer to Senior

John L Rusher Jr—Tech sales rep, American Cyanamid Co, Textile Chem Dept, Charlotte, NC. Sponsors: J N Grant, C N Whiteside.

Southeastern Section

Senior

Curtis E Adamson—Dyeing foreman, West Point Mfg Co, Newnon, Ga. Sponsors: H F Taylor, R M Jones.

Associate

Walter A Detamore — Chemical sales, Chemical Products Corp, Cartersville, Ga.

WESTERN REGION

Mid-West Section

Associate

Arthur W Forbriger Jr—Product dev mgr, The Realistic Co, Cincinnati, O.

Student

Pauline K Gubbels—Graduate student, Purdue Univ, West Lafayette, Ind. Sponsor: R Padgett.

Transfer to Senior

Thomas E Cortese—Chemist, Aurora Bleachery Inc, Aurora, Ill. Sponsors: E Larrat, F H Gurry.

STUDENT CHAPTERS

Georgia Institute of Technology

Harvey O Halman Jr, William K Hammond, Emory E Stewart—Students, Georgia Institute of Technology, Atlanta, Ga. Sponsor: James L Taylor.

Lowell Technological Institute

Kandid Ahmed Kandil—Student, Lowell Technological Inst, Lowell, Mass. Sponsor: G Griffin.

Philadelphia College of Textiles & Science

Walter R Topieniak—Student, Philadelphia College of Textiles & Science, Philadelphia, Pa. Sponsor: W H Hughes.

AT LARGE

Senior

Oliver R Kerr—Textile chemist, Sudamtex de Venezuela, Caracas, Venezuela. Sponsors: G G Wunsch, G J Mandikos.

Transfer to Senior

Silas E Cesan—Lab chemist, Sudamtex de Uruguay, SA, Colonia, Uruguay. Sponsors: G P Paine, G J Mandikos.

Future Papers

"Science and Craft in Color"—Panel

"Modern Continuous Dyeing Processes"—Richard Kern, Sandoz Ltd

"A Study in Union Dyeing"—Northern New England Section

"New Color-Measuring Instruments for Use by the Textile Industry"—F J Rizzo and A O Ramsley, Quartermaster Research and Engineering Command, U S Army

"The Application Principles of Acrylic Backcoating"—Charles E Hoey, Rohm and Haas Co

"Dyeing Zefran Acrylic Fiber in Blends"—F M Rawicz and S Helfand, Dow Chemical Co

"American Standard Performance Requirements for Textile Fabrics"—Ephraim Freedman, Macy's Bureau of Standards

"The Effect of Weft Yarn Twist upon the Properties of Cotton Fabrics Before and After Resin Treatment"—Edna Meshke, Univ of California

Activities of the Local Sections

Northern New England

(Photos by L E Rossiter, Nopco Chemical Co)

THE wooden nutmeg, a product of limited distribution, could not have come into existence under the pressure of public disapproval generated by today's mass market of twenty million people.

This assertion was made by Samuel J Golub, associate director, ACH Fiber Service, Inc, Boston, Mass, who spoke before a meeting of some one hundred members and guests of the Northern New England Section on March 24 at the Colonial Country Club, Lynnfield, Mass.

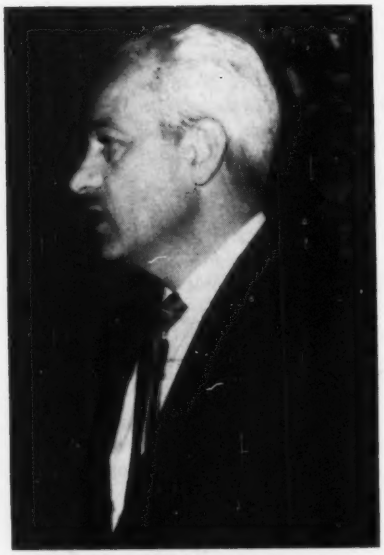
Dr Golub's talk, "The Impact of the New Labeling Act on the Textile Industry", described the growth of consumer preference for government regulation in the control of product quality and predicted the act was a forerunner of things to come in the further regulation of commercial standards by government. The expense of such regulation: added cost of quality, closer control, independent laboratory testing and paperwork, will be passed on to the consumer. In addition, Dr Golub warned of the disadvantages: the consumers' acceptance of a 100% label as a quality standard, self-seeking individuals who will find loop-holes, the acceptance of fiber guarantee as a purchase specification, and the prohibitive cost of testing on small lots, and low-quality goods.

On the credit side, the speaker pointed out that technological improvements usually accompany enactments of this sort, cost increases may be expected but they are not burdensome, the consumer and the legitimate manufacturer should benefit from the resulting equalized competition.

Preceding the introduction of the speaker at this meeting, Roland E Derby Jr, The Derby Co, received a Certificate of Service in appreciation and recognition of his technical and scientific contributions to AATCC

Portion of head table at NNE Section's March 24 meeting———L to r: Robert D Robinson, Councilor; Samuel J Golub, speaker; Edward J McNamara Jr, chairman; Geo O Linberg, past president, AATCC; Donald H Thomas, Councilor

J P Stevens & Co, Inc's representatives at the meeting, l to r: H L Orestine, W G Phillips, R Pelletier, and J F Matthews.



Samuel J Golub, associate director, ACH Fiber Service, Inc, addressing NNE meeting

Roland E Derby Jr, The Derby Co, (left) receives Certificate of Service from Edward J McNamara Jr, NNE chairman

Program Chairman Frank J Rizzo (left) greets Samuel J Golub, speaker

research and to the textile industry during his 1958-1960 term as chairman of the Committee on Color. This award was made by Chairman Edward J McNamara Jr at the request of President Elliott Morrill.

On May 5-6, the Northern New England Section will join the Rhode Island and Western New England Sections in a Regional Meeting to be held at the Jug End Barn, South Egremont, Mass.

•

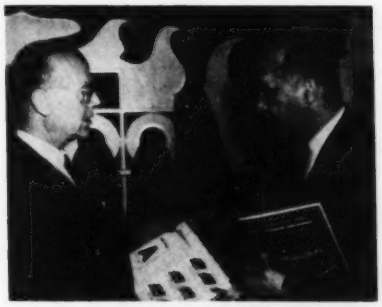
Rhode Island

(Photos by Kenneth C Everett)

FOR the first time since it was organized over 35 years ago, the Rhode Island Section conducted a member-guest meeting, which resulted in an attendance of 80 people. Regular attenders made the point of inviting non-attending members along with nonmembers to the meeting at Cranston, RI on Friday, March 24. Rhode Island sectional officers will recommend to national headquarters that all sections conduct similar meetings annually.

The speaker of the evening was Raymond J Schuster, Technical Sales Division of The Chemstrand Corporation, Decatur, Ala, whose subject covered "Dyeing and Finishing of Acrilan and Acrilan Blends". Several colored slides were shown along with a large exhibit of practical plant dyeings and finishes. Mr Schuster was assisted by Gerard M O'Mahony, also of Chemstrand Corp.

Mr Schuster dealt with the practical aspects of dyeing and finishing Acrilan fabrics and blends of Acrilan with wool and cellulosics. In his talk, he included information on package dyeing, stock dyeing with chrome colors, and dyeing of blankets. Wet and dry finishing of wool blends was touched upon.



Raymond J Schuster (left), guest speaker, chats with RI Section Treasurer Harold B Sturtevant at Section's Member-Guest Meeting of March 24

John J Roarke, Bradford Dyeing Assoc, chairman, Rhode Island Section, announced the appointment of Francis H Casey, Sandoz, Inc, as Councilor to fill the unexpired term of Arthur F McLean, who resigned from this position when joining the Pond Lily Co in New Haven, Conn.

Mr Roarke also announced the appointments of William J Crawford, Cranston Print Works Co, Cranston, RI, and William S Barnes, Original Bradford Soap Works, Inc, W Warwick, RI, to be cochairmen of the Intersectional Contest Paper Committee, made vacant by the resignation of Warren N Parsons, now with Kendall Mills, Walpole, Mass.

The Section's next meeting will be held jointly with the Northern New England and Western New England Sections at the Jug End Barn, South Egremont, Mass.

Southeastern

BLEACHING was the theme of the Southeastern Section's regular quarterly meeting held Saturday, April 22, at the Atlanta Athletic Club, Atlanta, Ga. Robert W Wurst, Pennsalt Chemical Corp, was the sectional committeeman in charge.

In the morning session, Harry G Smolens, technical adviser, Pennsalt Chemicals Corp, spoke on "The Introduction of Chlorine Gas to Continuous Peroxide Bleaching".

Mr Wurst moderated the afternoon round-table discussion on Textile Bleaching—Raw Stock, Thread, Yarn, Knit Goods, and Cloth. Technical representatives from Becco, Solvay, Olin Mathieson, and Pennsalt answered questions.

•

Western New England

A regular meeting of the Western New England Section was held at Rapp's Restaurant, Shelton, Conn, on Friday, March 17, with 50 in attendance.

Speaker of the evening was Albert C Nuessle, head, Textile Application and Service Laboratory, Rohm & Haas Co, who discussed "Creaseproofing and 'Wash-and-Wear' Finishing".

The Section's next meeting will be held jointly with the Northern New England and Rhode Island Sections at the Jug End Barn, South Egremont, Mass, May 5-6. The Ladies Night Meeting will be held May 19.

(*See photos on page 52*)

PRINCIPALS AT RHODE ISLAND SECTION'S "MEMBER-GUEST" MEETING——L to r: Raymond J Schuster, The Chemstrand Corp, guest speaker; Richard V Dugdale, Rohm & Haas Co, RI secretary; John J Roarke, Bradford Dyeing Assoc, RI chairman; Harold B Sturtevant, R I School of Design, RI treasurer.

Among those attending the Rhode Island Section's "Member-Guest" meeting on March 24:

Front row, l to r: James Falcon, George Dobson, Clinton Broadhurst.

Standing, l to r: Dick Mullen, Donald Neal, Albert Lombard.

WESTERN NEW ENGLAND SECTION MEETING

Rapp's Restaurant, Shelton, Conn • March 17, 1961

HEAD TABLE—WNE SECTION MEETING OF MARCH 17
———L to r: William H Espelin, Ciba Co, Inc, secretary; Albert H Rant, Laurel Soap Mfg Co, Inc, chairman; Albert C Nuessle, Rohm & Haas Co, guest speaker; Timothy J Horan, Princeton Mills, vice chairman

Albert C Nuessle, Rohm & Haas Co, guest speaker at WNE Section's March 17 meeting

Technical Program Completed for NE Regional Meeting

THE New England Regional Meeting, to be held May 5th and 6th at the Jug End Barn, South Egremont, Mass, will be highlighted by some very fine tecnnical papers presented by authorities in their specific fields. The papers on Friday will be confined to the cellulosic field whereas the papers presented on Saturday will be devoted exclusively to the wool and wool-blend field.

The speakers and the papers which they will present on Friday are as follows:

A H Wyld, Imperial Chemical Industries, "Progress in Textile Printing with Selected Fiber-reactive Dyes"

Fernand Schlaeppi, Ciba Co, Inc, "Some Theoretical and Practical Aspects in the Application of Reactive Dyes."

David Reid, Southern Regional Laboratory, United States Departmen of Agriculture, "Some Recent Work on Chemical Finishing Agents for 'Wash-and-Wear' Cottons."

Saturday's speakers and their papers are as follows:

John F Krasny, Harris Research Laboratories, "Status of 'Wash-and-Wear' Wool Development."

Rolf Gross, Sandoz Ltd, Basle, Switzerland, "New Aspects in the Dyeing of Wool and Synthetic Blends".

Daniel Frishman, Malden Mills, "Recent Developments in the Knitting Field."

This is the first attempt of the three New England sections of the AATCC to hold a regional meeting and a large turnout is anticipated. The Jug End Barn has very fine recreational facilities including a nine-hole golf course, a heated swimming pool, and horseback riding. Everyone is welcome to attend this two-day meeting.

W George Parks, Univ of Rhode Island, who has recently returned from a trip to Russia, will be tht after-dinner speaker on Friday evening. His subject will be "My Personal Experiences Inside Russia."

The revised program for the two days is as follows:

Friday, May 5th—

9:00 AM—Registration

12:00 noon—Luncheon

2:00 PM—Technical session on cellulosic fibers

8:00 PM — Dinner — W G Parks, AATCC vice president, New England Region, guest speaker

Saturday, May 6th—

8:00 AM—Breakfast

9:15 AM—Technical session on wool and wool blends

12:30 PM—Luncheon

2:00 PM—Recreational activities

The chairman of the New England Regional Meeting is Robert D Robinson of the Northern New England Section.

ADR News Report:

General News of the Industry
Personalities in the News
New Products, Developments, Processes

Hercules Dedicates 2nd Polyolefins Plant

Hercules Powder Co's new and second polyolefins plant was dedicated April 6 at Lake Charles, La.

The Lake Charles plant has a capacity of 60 million pounds a year and augments Hercules' first polyolefins plant, which has been operating at Parlin, NJ since 1955.

While Governor J H Davis of Louisiana and Albert E Forster, president and board chairman of Hercules, were making the traditional dedication speeches at Lake Charles, construction work continued on a second 60-million-pound unit at the Lake Charles site. When this is completed in 1962, the 120-million-pound capacity at Lake Charles, plus 80 million pounds a year at Parlin, will enable Hercules to produce 200 million pounds annually of high-density polyethylene and crystalline polypropylene. Both of these new materials have found wide uses in the plastics industry, and show promise in film and fiber.

Other Hercules executives participating in the dedication ceremony were Werner C Brown, general manager of Hercules' Cellulose Products Department, which operates the Lake Charles plant; David S Bruce, the department's director of operations; and Earp F Jennings Jr, manager of the plant.

An ultra-modern, completely automated plant, the Hercules polyolefins facility gets its propylene raw material from Petroleum Chemicals, Inc, several hundred yards away.

Production at the Lake Charles unit will initially be confined to Pro-fax polypropylene. This material, developed by Hercules at its Research Center, near Wilmington, Del, was first commercially produced at Parlin, NJ, in 1957. For almost two years Hercules was the only commercial producer of polypropylene in the United States.

Pro-fax, a light-weight commercial plastic, with outstanding heat resistance, chemical resistance, impact strength and rigidity in thin wall sections, is used for injection-molded articles, film, rope, outdoor furniture webbing, and many other fiber applications including textile fabrics and carpeting.

In November, 1960, Hercules purchased a fiber-spinning facility at Covington, Va, where it will produce 10 million pounds a year of Prolene polypropylene fiber to test uses of the material in fibers.

Considerable progress has been and is being made in the dyeing of polypropylene fiber, according to Gilman S Hooper, director of research and development of Hercules' Fiber Development Division.

Stating that Hercules has worked out a fair range of light to medium colors, he said that many dyestuffs will color polypropylene to a deep shade, but it has been found that relatively few systems give colors that meet requirements for washfastness, lightfastness, freedom from crocking and resistance to drycleaning.

Based on strength and toughness, the Hercules fiber, Prolene, should be an "excellent fortifying fiber," he said, although end-use work in this field has been limited. He expressed enthusiasm about the possibilities of rayon-Prolene blends, citing increases in tear and burst strength and abrasion resistance.

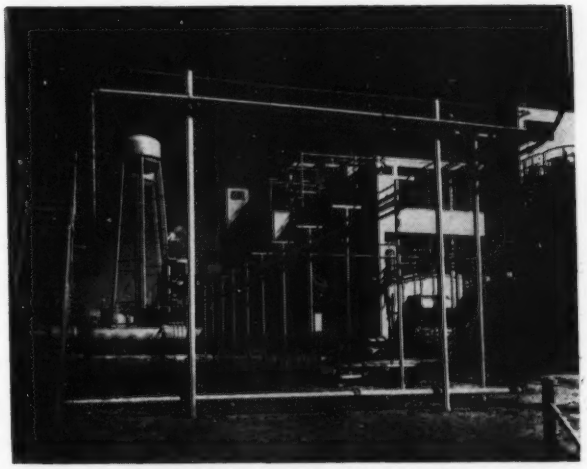
One of the more promising fields is in pile fabrics, particularly carpets, he indicated, where low density gives high coverage and toughness provides excellent wear.

The yarns can be heat set, he said, to retain texture against scouring. As little as 30 percent in wool permits a "marked degree of heat setting," he said.

The fiber also shows good resistance to soiling, he said, "being even measurably better than nylon in this respect", and "recovers its original appearance well on scouring."

"It is our hope and belief that its many excellent properties and potential low price will enable polypropylene fibers to become an important and widely used addition to the family of fully synthetic textile fibers.

With respect to dyeing of the fiber, he said a group of disperse dyes shows good leveling properties, good resistance to crocking, only fair resistance to drycleaning, washing and light and generally poor exhaustion, "but they still do a fair job."



Hercules Powder Co's newest polyolefins plant located at Lake Charles, La, went on stream early in 1961. Shown in the picture is the first completed unit near which a second unit doubling the capacity of the plant is being built. The closed structure at left is the molding powder building where the material is extruded under heat and pressure, pelletized and packaged for shipment. To the right is the process area.

A group of azoic dyes reportedly gives bright colorings with full penetration, good wash- and crockfastness and fair to excellent perclene fastness. Lightfastness in this group varies from 20 to 80 hours in a Fade-Ometer, it is claimed.

Vat esters have been found to give light shades on the staple fiber, yarn or fabric. They reportedly have good fastness to light, with fairly good washfastness and acceptable fastness to drycleaning. They are said to give excellent unions between polypropylene and cotton.

Hercules has found that light shades of good fastness to light, wet processing and drycleaning can be obtained with a limited group of vat dyes. However, they are difficult to level and present a serious crocking problem if used in heavy shades. It is recommended that the use be confined to stock dyeing of staple fiber.

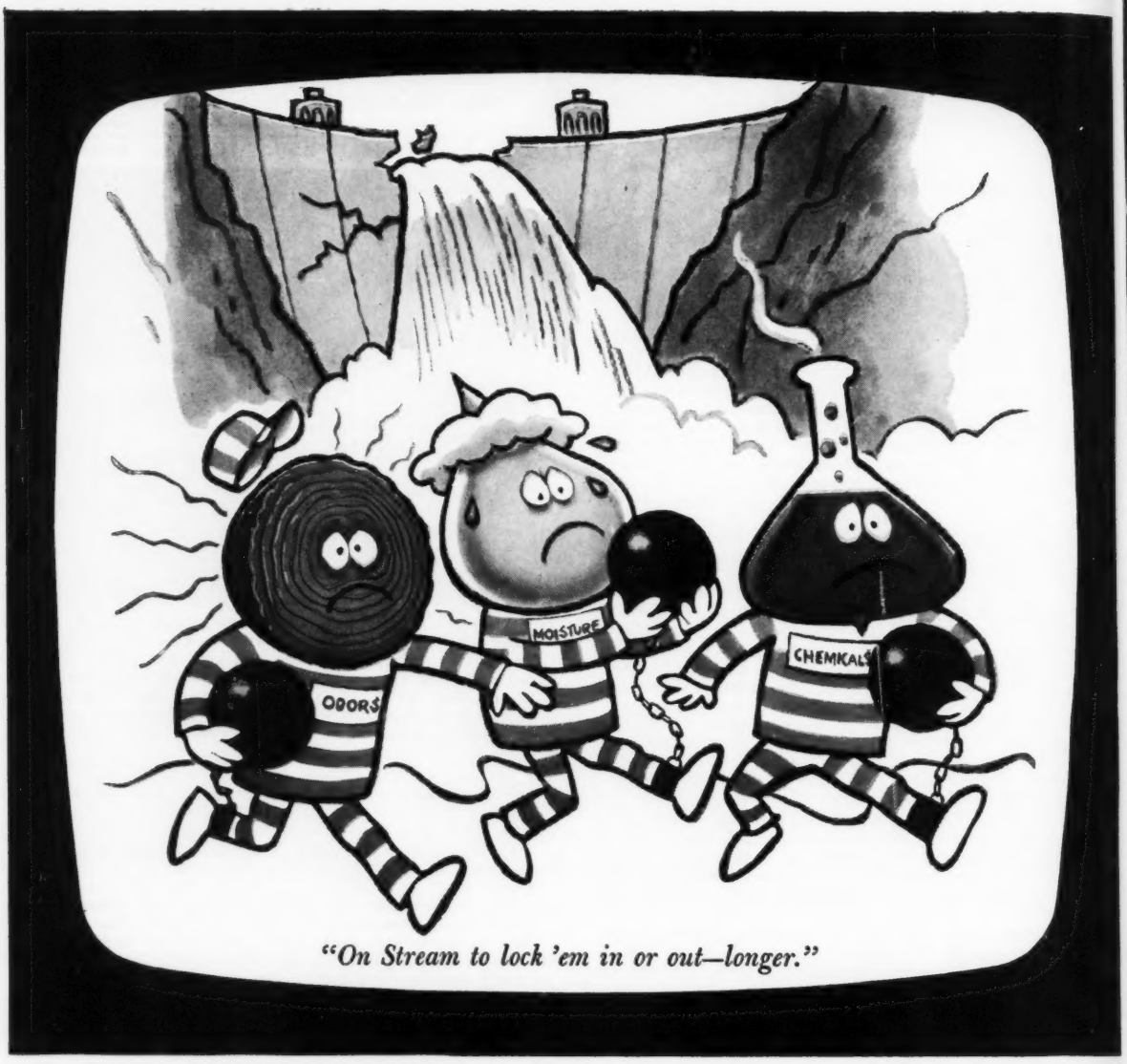
•

Research in Clothing Performance Needed, Says Home Economist

"Applied research is respectable and must go hand in hand with fundamental research," Dorothy S Lyle, president of the American Home Economics Association, told members of the Kansas-Missouri Home Economics Association at a meeting in Kansas City, April 7. Dr Lyle herself is active in research in the practical performance of textiles and clothing in her work as director of consumer relations for the National Institute of Drycleaning in Silver Spring, Md.

"Home economics research in colleges and universities," she said, "could make a contribution by exploring the real problems confronting American families in the areas of textiles and clothing."

She mentioned many of the problems of clothing behavior which have come to light in the analysis laboratories of the National Institute of Drycleaning. Drycleaners send problem garments to the Institute for analysis when there is some failure in their performance. In 1960, Dr Lyle said, the Silver Spring laboratory received 22,315 such problems. Data from the drycleaning institute comprises 80% of data assembled by the American Association of Textile Chemists and Colorists from nine different laboratories in the textile



"On Stream to lock 'em in or out—longer."

14,000,000 LBS. RESYN® 3600

POLYVINYLIDENE CHLORIDE LATEX FOR PROTECTIVE COATINGS

Our 14,000,000 pound RESYN 3600 plant is now "on stream" at Meredosia, Illinois. This marks the first commercial production of National's water dispersed polyvinylidene chloride and brings combined capacity at Meredosia to more than 80 million pounds of polymer emulsions and latices annually.

RESYN 3600 promises a revolution in protective coatings and finishes with simple low cost application by sizing, padding, coating or spraying. Its barrier properties are exceptional:

MOISTURE—Moisture vapor transmission is 2½ to 5 times lower than that of polyethylene. ODORS—Resistance to transmission of common gases 1000-2000 times greater than polyethylene. CHEMICALS—Almost complete non-reactivity to concentrated acids, solvents, alkalies and other corrosive materials. Completely resistant to grease and oil. Fire retardancy is excellent.

RESYN 3600 is suggested for industrial fabrics, work clothing fabrics, denims, filter clothes, military fabrics, awnings and tarpaulins, etc. It is also recommended as a binder for nonwoven fabrics and as a finish to minimize crocking of dyestuffs. Call or write your nearest National office for full information.

National RESINS NATIONAL STARCH and CHEMICAL CORPORATION

750 Third Avenue, New York 17 • 3641 So. Washtenaw Avenue, Chicago 32 • 735 Battery Street, San Francisco 11

And All Principal Cities in the United States, Canada, England and Mexico

and clothing field. This pool of performance information is useful, Dr Lyle pointed out, as a barometer of the seriousness of particular problems and as a guide in research and development of more serviceable products.

The big flow of foreign yardage into the U S during 1960 has brought many new complaints to American drycleaners, Dr Lyle said. Examples are Italian tweeds in which the black dye bleeds when cleaned, Italian knits which shrink easily or which contain a fluorescent dye that is sensitive to light. Another imported problem is the cotton poplin carcoat which is coated on the underside of the outer fabric with a rubber film. In cleaning the film pulls partially away from the fabric, leaving blisters which can't be smoothed.

Then there are head-sensitive fibers like Movil from Italy and Rhovyl from France which have been used in knit goods, and there's an imported knit of 70% wool and 30% Azlon (synthetic protein fiber) which develops holes in drycleaning.

Dr Lyle said the Institute's studies find that performance problems follow a consistent pattern year to year, and 1960 experience was typical. Of the total damage cases examined 37.4% were attributed to the way in which the consumer used or misused the article; 36% were due to defects in the fabric; 20.6% were caused by faulty drycleaning practice; 3.8% were of unknown origin; 1.8% were the result of garment construction; and .3% were new problems not yet classified in these categories.

Leading consumer-caused problem was cold-wave damage. This is a color loss in the fabric caused by spilling hair setting solution on clothing. Other common consumer caused damages were from mineral acids, carmelized sugar stains, scorch or fusing due to heat, oxidized oil stains, and insect damage.

Most common problem listed as due to the fabric was that of dyes which became loosened and lost in drycleaning solvent. Sun-tendered draperies ranked second. Fabrics which shrink ranked among the leaders in this group, Dr Lyle said, and noted that "of the 666 items on which a shrinkage complaint was registered, 227 were on jersey garments, either wool or wool and Orlon."

Of all complaints on loss of color from abrasion, Dr Lyle said, "50% were on blue cottons and the remainder on printed goods."

Damage attributed to the drycleaner included mainly rips and tears, staining in drycleaning, and color loss due to improper techniques. More than a third of the garment construction problems were caused by buttons—chemical damage from nitrate buttons, stains from adhesives on buttons or from fugitive button dyes.

The new unclassified problems were the bleeding of dye from silks and the discoloration and loss of flocking from suede-like cloth.

The Textile Fiber Products Identification Law of March 1960 does little, Dr Lyle said, to help the consumer in selecting and caring for modern fabrics. Fiber content is only one key to fabric or garment quality, she said. There are seven keys in all. The other six are: yarn construction, fabric construction, dyeing and printing, finish, decorative design, and garment construction.

Blending dark wool yarns with light synthetic yarns has resulted in dark oily-looking "stains" when heat shrinks the synthetic yarns and pulls the dark wool together at the surface. Dr Lyle said only scissors can remove such a "stain".

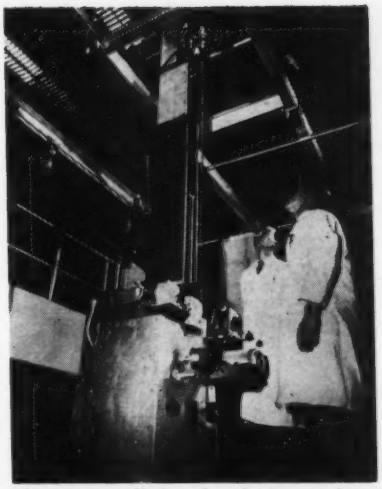
As for fabric construction, she pointed out that wool cable knits may shrink more than wool herring-bone knits, and she mentioned the newly popular urethane foam interlining which does not shrink though the fabric it is adhered to may. She mentioned Indian Madras as a dramatic example of a dye problem. It is yarn-dyed with vegetable colors which run and bleed and have poor fastness to light.

As for finishes, she mentioned resin finishes which impart drip-dry properties to fabrics including resistance to wrinkling, creasing and crushing but which cause an odor problem or a loss in fabric strength or yellowing in bleaches.

Decorative designs, like lacquer prints, gold overprints, or painted designs, are often less drycleanable than the basic fabric, Dr Lyle said, and this causes care problems.

She explained the seventh key to garment quality, garment construction, citing the contour belt as an example. Its backing may shrink or the adhesive may soften, causing the backing and the stiffener to pull apart.

Problems like these are real and practical, according to Dr Lyle, and she encourages college home economics research to tackle them.



Instrumented and controlled melt spinning equipment recently put into operation at Fabric Research Laboratories, Inc, as part of its new experimental fiber spinning laboratory.

Fiber Spinning Lab Established at FRL

An extensive laboratory for the experimental spinning of synthetic fibers has been established at Fabric Research Laboratories, Inc, Dedham, Mass.

The new facility, which has been more than two years in planning and construction, is said to be capable of both melt and solvent (dry) spinning, which includes nylon, polypropylene, polyethylene, polyester, polyvinyl alcohol, acetate, and acrylic fiber spinning methods.

Three types of equipment—two built by FRL and one purchased on an exclusive basis from Chemtex, Inc of New York—reportedly have a capacity from very short runs on single filaments to fully controlled, limited pilot production of multifilament yarns. With this range of equipment it is said to be possible to determine not only that a polymer can or cannot be spun into a fiber but also something of the manufacturing variables which contribute so significantly to the cost of a commercial synthetic fiber operation.

Seventy-five percent of the new equipment's capacity will be used on a consulting basis by established fiber producers and by chemical and petrochemical companies who are interested in exploring the synthetic fiber field. FRL is reserving 25% of capacity, for self-sponsored, fundamental studies which it intends to publish in the technical literature.

●

GDC Introduces New Black Dyes

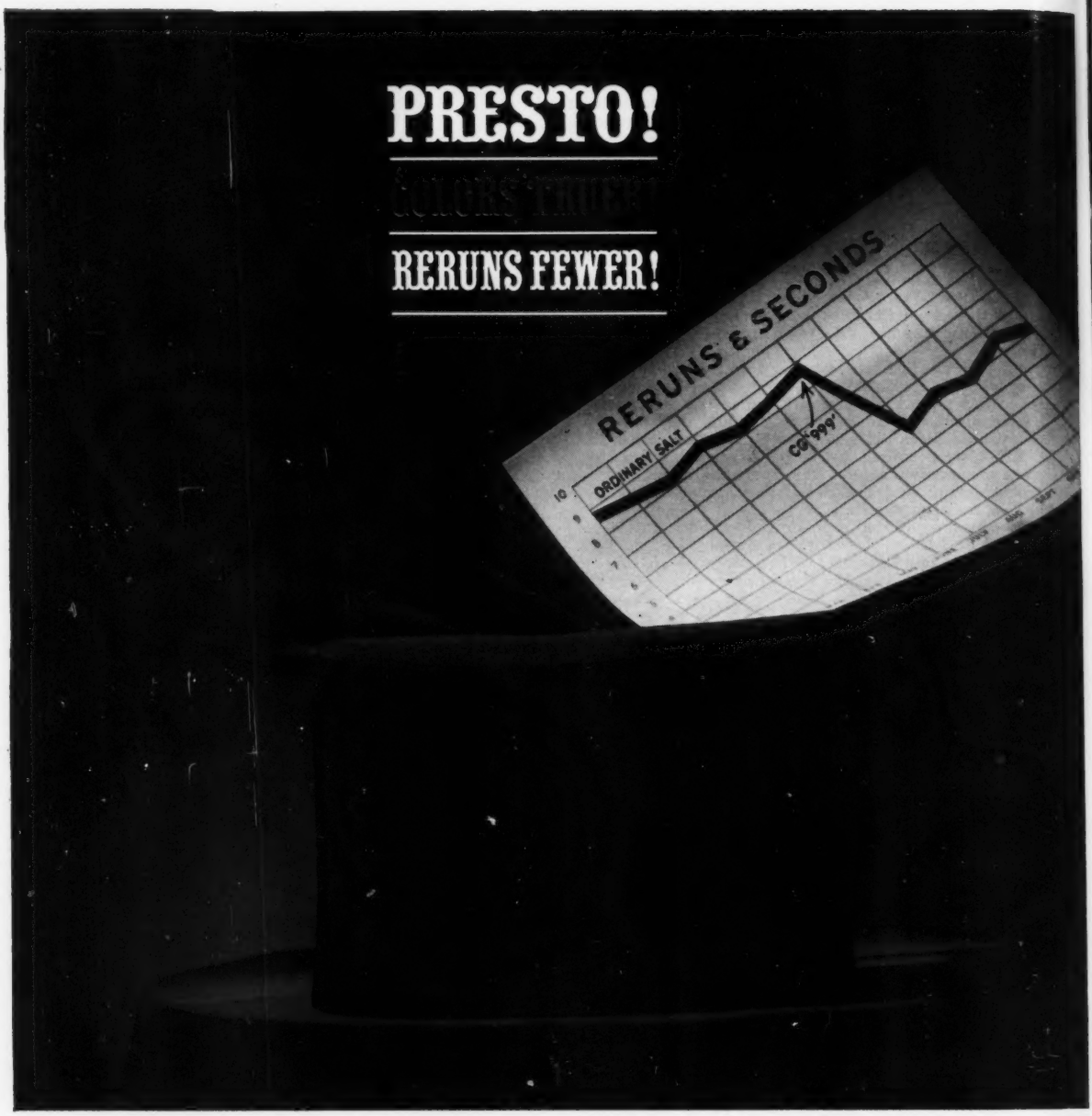
General Dyestuff Co, a Division of General Aniline & Film Corp, has announced the introduction of three new black dyestuffs—Rapidogen Black GG Solution, Rapidogen Black JF Solution and Rapidogen Black GRW Solution. The three products are stabilized azoic compositions reportedly offering individual shades for printing high-quality blacks on cottons or rayons.

Application is by direct roller and screen-printing methods, with development by acid aging only. Including a greenish, a bluish, and a jet black in self shades, and suitable for combining with other Rapidogen dyes, they are said to serve best in printing deep blacks economically.

Fastness tests reportedly show that fastness to light, washing and hot pressing is very satisfactory for cotton or rayon dress goods. The lightfastness ratings given are for full shades only as the dyes are not intended for use in lighter shade depths. Because of their very good fastness to formaldehyde, these dyestuffs are suitable for printing in patterns with pigment-containing resins that release formaldehyde in curing, it is claimed.

The three Rapidogen black dyes are all supplied in solution form, and are readily incorporated into printing formulations as regularly made up with neutral starch-tragacanth thickening.

Additional information on shades, working properties, uses, application fastness ratings and formulations may be obtained from General Dyestuff Co, 435 Hudson St, New York 14, NY.



With Morton Chemical Grade '999' Salt

It's not magic . . . but sometimes the results you get when you switch to high purity Morton Chemical Grade '999' Salt seem almost magicall Colors are truer . . . exactly as the manufacturer intended them to be. And reruns and seconds often drop 50%—as shown by actual records.

With salt of average purity, calcium and magnesium compounds complex dyes and reduce their effectiveness. But with high purity Chemical Grade '999,' you get 99.95% pure sodium chloride with a trace of sodium sulphate—as recommended whenever commercial calcium-free salt is required.

When Cost Is the Determining Factor, Use Morton Purex Salt. Morton Purex Salt is the ideal salt for textile use when high purity is not essential. Purex is guaranteed to have a minimum purity of 99.5%, and to be 100% soluble. Like Chemical Grade '999,' and all other grades of Morton Salt, it is easily and quickly available anywhere in the U.S.

MORTON SALT COMPANY Industrial Div.
Dept. 0000, 110 N. Wacker Drive, Chicago 6, Ill.

Please send me more information about

- ☐ *Morton Chemical Grade '999' Salt*
- ☐ *Morton Purex Salt*
- ☐ *I would like to talk to a Morton representative about other grades of salt used in the textile industry.*

*Name*_____

*Title*_____

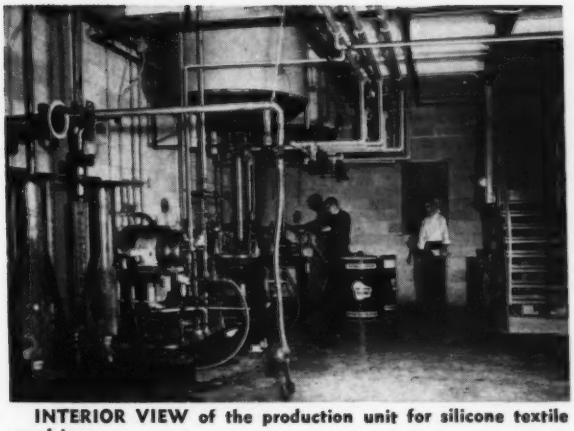
*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

One of Dow Corning Corp's newest facilities is this modern office and laboratory building shown, as recently completed, at Greensboro, NC.

A view of Dow Corning Corp's production building and warehouse at Greensboro.



INTERIOR VIEW of the production unit for silicone textile emulsions.

Dow Corning Opens Textile Service Center in Greensboro

To provide improved technical service to the Southern textile industry, Dow Corning Corp, Midland, Mich, has expanded its laboratory and production facilities in Greensboro, NC. Two new buildings, each with approximately 10,000 square feet, have been completed at 2910 Patterson Street. One building houses new production and warehousing facilities for Syl-mer and Syl-soft brands of silicone textile finishes; the other contains laboratory facilities for technical service, product development and quality control.

An important phase of Dow Corning's expanded Greensboro laboratories is continual quality-control testing of fabrics submitted by mills and finishers to meet performance standards established for Syl-mer identification. These tests include initial water repellency, resistance to a standardized staining material, and durability after launderings or drycleanings.

Product development activities include trial runs at textile plants with new or improved Syl-mer textile emulsions, and recommendations for bath formulations where Syl-mer is used in combination with other textile finishing agents. At the present time there are seven types of Syl-mer emulsions sold, each one tailored to a specific fabric or finishing process.

TECHNICAL LITERATURE

(Literature is available from sources listed in italics)

AATCC FLAMMABILITY TESTER—*Instrument and Apparatus Div, United States Testing Co, 1415 Park Ave, Hoboken, NJ*—Bulletin describes this laboratory instrument which was developed to measure the flammability of clothing and textiles for clothing use under carefully controlled conditions.

The flammability tester reportedly meets the requirements of AATCC, ASA, ASTM, and Commerical Standard test methods. The instrument features a spring-motor driven gas jet for controlled flame exposure and an automatic stop watch mechanism for high-accuracy determination of flame spread rate.

●

AMERICAN FABRICS ENCYCLOPEDIA OF TEXTILES—*Prentice-Hall, Inc, Englewood Cliffs, New Jersey, $39.50*—The history of textiles—its fibers, designs and processes—is graphically told in this single-volume source work. Supplemented throughout with black and white illustrations, it also contains 16 pages in full color showing some of the fine textile craftsmanship done in East and West through the centuries.

The encyclopedia is divided into seven main sections: 1) "The Textile Fibers," including a thorough treatment of the new scientific fibers; 2) "History & Origins," telling the dramatic story of the industry; 3) "Textile Design," illustrating the world's historic textiles; 4) "The Manufacturing Processes," containing comprehensive treatments of spinning, weaving, knitting, lace-making, felts, and nonwovens; 5) "Fabric Finishing," with detailed discussions of all the modern processes, the story of color dyes and dyeing, plus a review of textile printing in its many forms; 6) "Specialty Uses of Textiles," covering non-apparel fabrics, such as curtains, draperies, rugs, carpets, sheets, quilts and industrial fabrics; 7) "Textile Definitions," 90-page dictionary of important terms in textile usage.

Prepared and written by the editors of *American Fabrics*, the book uses methods of visual presentation pioneered by that magazine.

AMINO ALCOHOLS—*Jefferson Chemical Co, Inc, 1121 Walker Ave, Houston 2, Tex*—Brochure contains latest available data on mono-, di- and triethanolamines, important amino alcohols which were first introduced in this country in 1928.

These components are obtained when ethylene oxide is reacted with ammonia and the resulting mixtures subjected to a series of separations.

Brochure deals with physical and chemical properties, application information, and toxicity handling and storage data. An extensive bibliography is included.

●

ATMOSPHERIC FUME CHAMBERS—*United States Testing Co, 1415 Park Ave, Hoboken, NJ*—Atmospheric fume chambers, the drum model and squirrel cage model, are designed to determine colorfastness of fabrics.

Sometimes referred to as gas-fading chambers, the instruments are also applied to the evaluation of gas fading inhibitors and used to measure the effects of ozone and other gases on various materials.

●

AUTOMATIC COLOR MEASUREMENT EQUIPMENT—*Colorimetry Division, Allied Research Associates, Inc, 43 Leon St, Boston 15, Mass*—Two 4-page brochures describe the new Green-Bartlett technique of high-speed full automatic color measurement. This equipment is designed to provide precise color signatures at rates as high as 30 samples per second.

The Green-Bartlett color-reading head reportedly lends itself to both tristimulus and abridged spectrophotometric color determinations over the entire visible color space on products with low reflectance and transmittance. Values of color coordinates are converted to digital form for high-speed computation and decision making. For use in high-speed sorting or feedback process control, the digital output of the Green-Bartlett colorimeter reportedly can provide the necessary command signals actuating mechanisms for sorting or for instantaneous process correction. Equipment is

A NEW GERM PROTECTION FOR THE FAMILY HEALTH

"DBH"

an effective weapon against

BACTERIA • FUNGUS • MOLD • ODOR

— remains bacteriostatic after many repeated launderings

— NO COLOR CHANGE • NON-TOXIC • ODORLESS • SAFE

— compatible with Resins • Non-ionics and Cationics

— tested and confirmed by independent Bacteriological Labs.

CHEMICAL PRODUCTS CORPORATION

Manufacturing Chemists

WEST PATERSON • NEW JERSEY · OFFICES AND WAREHOUSES · CHARLOTTE • NORTH CAROLINA

widely applicable to production and research color measurement and control problems in science and industry.

Information on this equipment differs in each of the brochures, one of which deals with general product sorting capabilities, and the other with technical details and applications of the colorimeter.

●

BULLETINS 61 AND 62—*United States Testing Co, 1415 Park Ave, Hoboken, NJ*—These bulletins describe special and custom-built laboratory instruments produced by USTC's Instrument and Apparatus Division.

Bulletin 61 describes such instruments as the Walker abrader, inspection card winder, washfastness tester, and hydrostatic tester.

Bulletin 62 describes such instruments as the automatic length recorder, designed to record lengths of flexible or semirigid materials; the organic coating adhesion tester, a portable instrument for providing a qualitative method of evaluating scratch adhesion resistance of organic finishes; the film impact tester, SPI impact tester, and torsional tester.

●

CARBOWAX POLYETHLENE GLYCOLS—*Union Carbide Chemicals Co, Div of Union Carbide Corp, 270 Park Ave, New York 17, NY*—This 65-page booklet contains comprehensive data on Carbowax polyethylene glycols 200, 300, 400, 600 which are liquids; and 1000, 1500, 1540, 4000, and 6000 which are solids at room temperature. Carbowax methoxy polyethylene glycols 350, 550, and 750; and polyethylene glycol compound 20M are also covered.

Included is information on physical properties, solubilities; specification limits; test methods; storage, handling, and shipping; toxicological properties; and selected literature references.

Special sections of the booklet describe the applications of these materials to textiles and other end uses.

●

CDS-129C—*General Electric Silicone Products Dept, Waterford, NY*—This new eight-page two-color catalog describes the complete line of General Electric silicones and their uses. It is liberally illustrated with photos and contains data pertaining to the various silicone products, including a complete selector guide for silicone rubber.

The catalog is broken down into four general categories dealing with silicone fluids, silicone protective coatings, silicone electrical insulation and silicone rubber. A new feature of the catalog is the grouping of product types wherever possible under appropriate end-use headings.

●

CHEMICALS FOR '61—*Ansul Chemical Co, Marinette, Wis*—This folder offers eight chemicals in development quantities and 13 chemicals in commercial quantities as well as a number of complete product brochures.

It invites inquiries on specialty chemicals and calls attention to Ansul's primary fields of interest: nitrogen heterocyclics, organic arsenicals and methylated products. The company is also a major producer of sulfur dioxide, sodium bisulfate and methyl chloride.

●

COMPILATION OF ASTM STANDARDS ON SOAPS AND OTHER DETERGENTS—*ASTM Headquarters, 1916 Race St, Philadelphia 3, Pa; $4.25*—This volume contains 24 specifications, 23 methods of test and a set of definitions. Three new methods for the analysis of synthetic detergents have been added and the other standards have been revised and brought up-to-date since they were published in the previous edition of 1959.

Also included are new proposed methods for the rapid determination of solids by infrared moisture balance and for measuring redeposition of soil on cotton fabric.

●

FABULITE—*Stowe-Woodward, Inc, Newton Upper Falls, Mass*—Data page describes an improved roll covering, an interesting characteristic of which is described as "an outstanding resistance to abrasion even under dry operating conditions". The roll cover is said to be successfully used in processing textiles, glass fibers, etc.

●

INVESTIGATION OF THE HIGH-SPEED IMPACT BEHAVIOR OF FIBROUS MATERIALS—Part 1—Design and Apparatus—C C Chu and others, Fabric Research Laboratories, Inc, for Wright Air Development Division, US Air Force; September 1960; 33 pages. *Order PB 171 311 from OTS, US Department of Commerce, Washington 25, DC; $1.* A high-speed impact test machine was designed, constructed and calibrated to test parachute components at high rates of loading. The instrument is capable of rupturing materials of up to 10,000 pounds static breaking strength at velocities of from 200 to 750 feet per second. Its impacting force is applied by a free flying missile launched by a gas gun using either nitrogen or helium gas at moderately low pressures; the gun has a bore of 2.5 inches and fires missiles weighing up to 10 pounds. Test data are obtained by multiple exposure photography with a multi-microflash lighting source that provides a maximum of 15 separate flashes spaced at predetermined intervals of between 10 and 10,000 microseconds. The resulting photograph records the specimen and the impacting missile before, during, and after the impact. Measurement of the distances between successive exposures yields information such as the breaking strength, the extension to rupture, and the energy absorbed by the specimen.

●

MHI TECHNICAL BULLETIN 509—*Creamer, Trowbridge & Case, 198 Dyer St, Providence, RI*—Metal Hydrides Incorporated Technical Bulletin 509 describes the treatment of glycols and polyglycols with sodium borohydride to remove trace carbonyl impurities. Treating techniques are summarized and the economics of the reduction are discussed in detail.

●

MORPHOLINE—*Jefferson Chemical Co, Inc, 1121 Walker Ave, Houston 2, Tex*—Technical brochure discusses this versatile chemical. Various derivatives are used as textile lubricants and sizing emulsifiers.

The brochure includes up-to-date data on sales specifications, analytical procedures, handling and storage, physical and chemical properties. It includes a toxicity statement and an extensive bibliography.

●

TEXTILE TERMS AND DEFINITIONS—*The Textile Institute, 10 Blackfriars St, Manchester 3, England*—These are additions to the now-standard publication "Textile Terms and Definitions", which the Institute publishes from time to time.

Included in the latest list is probably the most commonly used word in textiles, "yarn".

The suggested definition is "a generic term for a single monofilament or an assembly of either natural or manufactured fibers or filaments forming a continuous strand".

Terms and definitions are issued in two stages 1) Tentative and 2) Recommended as Standard.

The latest list comprises Tentative Terms and Definitions (ie, still under discussion).

●

THERMAL ANALYSIS OF SPACE SUITS IN ORBIT—T F Irvine Jr and K R Cramer, for Life Support Systems Laboratory, Wright Air Development Division, US Air Force; May 1960; 15 pages. *Order PB 171 143 from OTS, US Department of Commerce, Washington 25, DC, 75 cents.* This thermal analysis of a model space suit in orbit is presented as a guide for designers and also as a basis for more extensive studies for the prediction of a suited man's thermal environment in an earth orbit. Results show the feasibility of passive suit-temperature control through the proper choice of materials and surface spectral properties. Important thermal design parameters were developed and their physical significance was demonstrated. A machine computation program also was developed and calculations made for the extreme hot and cold cases. Additional calculations illustrate the range of suit temperatures within the designer's control.

●

US RUBBER CO SYNTHETIC LATICES—*Sales Promotion Dept, Naugatuck Chemical Div, United States Rubber Co, Naugatuck, Conn*—Intended as a guide for the industrial user of latex, this booklet lists the physical properties and suggested applications for more than a score of synthetic latices produced by the Division.

The eight-page booklet includes descriptions of "hot", "cold," copolymer, terpolymer, resin, creamed and centrifuged latex types.

●

USTC TEXTILE TESTING PRICE LIST—*United States Testing Co, Inc, 1415 Park Ave, Hoboken, NJ*—A new price list covers U S Testing Co's services in the textile field.

Some of the services included in this list are abrasion, aging, carpet, colorfastness, and hosiery testing; fabric construction and performance; fiber identification and composition; slide fastener tests; "wash-and-wear" tests; and defect studies.

TECHNICAL MANUAL OF THE AATCC

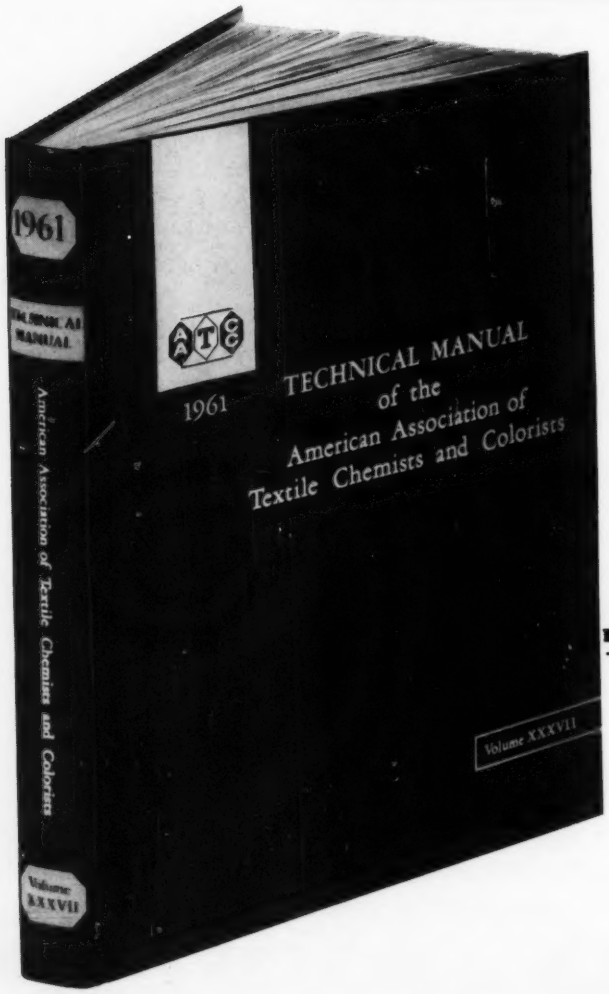
The only reference work and annual buying guide of the textile wet-processing industry.

BASIC FOR BUYER AND ADVERTISER ALIKE, BECAUSE...

It reaches 10,000 wet-processing specialists — chemists, bleachers, dyers, finishers, printers — every buying influence in the field.

It is used day in and day out, week in and week out, month in and month out — all year long — with advertising as vital as editorial data.

It is the BASIS of any advertising campaign to the wet-processing industry.



1961 EDITION IS NOW IN PREPARATION

CLOSING DATE MAY 31ST

Get a full year's sales impact—catalog your full line for best results

PHONE OR WIRE SPACE RESERVATION OR SEND OFF THE FORM PRINTED BELOW

ADVERTISING RESERVATION FORM

Howes Publishing Co. Inc.,
44 East 23rd St., New York 10, N.Y.
Telephone: SPring 7-9364

Please reserve ..... page(s) for our advertising in the 1961 Edition of the TECHNICAL MANUAL OF THE AATCC.

Firm Name.....

Address.....

City.....Zone....State.....

☐ See our advertising agency for copy.

PERSONALITIES IN THE NEWS

Perrin

Stott

Wegmann

Chaban

Bates

Brown

Appointment of *A L Perrin* as manager of the company's midwest district has been announced by Ciba Co, Inc. The appointment was effective March 1, the date on which *J Gordon Stott* retired from Ciba after 40 years of service.

Mr Perrin started his career with Ciba in 1948. Early last year he was transferred to the Company's midwest district, Skokie, Ill.

Mr Stott joined Ciba early in 1921, starting in Greensboro, NC where the company one time maintained an office. Between this period and early 1925, at which time he was transferred to what is now the company's midwest district, Mr Stott also worked as a sales representative out of Ciba's Philadelphia and New York offices. At the beginning of 1955 he was appointed manager of the midwest district. During World War I he served in the Marines for over two years. He has made his new residence in Florida, the address being 27 Northeast 11th St, Delray Beach.

In commenting further on Mr Stott's lengthy period of service with Ciba, Executive Vice President *Keith R J Horner* said—"Gordon Stott will be remembered for his great qualities of loyalty, technical competence and perserverance. He is immensely proud of the industry that he has served for so long and his notable services to it will not be forgotten."

●

Jacques E Wegmann, a chemist in the dye laboratories of Ciba Ltd, Basle, Switzerland, was presented April 12 with the Worshipful Company of Dyer's Research Medal for 1959-60.

Dr Wegmann, working for a two-year period with the Toms River Chemical Corporation, Toms River, NJ, was presented the award for his research on the effect of structure on the change in color of vat dyes on soaping.

The award, first given in 1908, is presented for important and significant research contributing to the knowledge of dyeing and other textile processes.

Dr Wegmann's research work provides an explanation of the way color changes shade in the soaping stage of the vat dyeing process. Dr Wegmann's findings can be considered an important contribution in the approach of relating chemical constitution and color with respect to the environment of a dye.

The Dyers' Company was formerly a guild of dye craftsmen and dates back to 1188. Known then as the Worshipful Company of Dyers', it was granted a charter of incorporation by Henry VI. The company is now mainly concerned with the advancement of science technology and the practice and theory of the coloring arts.

●

Two promotions in the marketing department of Monsanto Chemical Co's Plastics Division at Springfield, Mass, have been announced.

Chester L Jones, director of sales—resin products since 1954, has been promoted to assistant director of marketing, and *Edmond S Bauer,* formerly product administrator—resins and coatings, has been promoted to replace Mr Jones as director of sales—resin products.

●

Griffin Crafts, president, J W Wilson Glass Co, has been named general chairman of the Drug, Chemical and Allied Trades Association's 71st Annual Meeting to be held Sept 14-17 at the Pocono Manor Inn, Pocono Manor, Pa.

American Finishing Co, Memphis, Tenn, has announced the appointment of *Charles J Chaban* as vice president of its newly established Research and Development Division, and *George A Bates* as assistant to the president, *Charles F Goodman.*

Mr Chaban joins American Finishing after 18 years as vice president of the Coated Fabrics Div of Interchemical Corp.

Mr Bates, who will make his headquarters in Memphis, has served as plant manager since June, 1958.

●

Alfred E Brown, former vice president, has been elected president of Harris Research Laboratories, Inc, Washington, DC. He continues as director of research of the company, which he joined in 1945.

Dr Brown has announced that Harris Research Laboratories is planning expansion of its Applied Physics and Instrumentation group, which was formed last year. This group is now engaged in devising instrumentation for the textile and fiber industries, especially in regard to measuring appearance factors in textiles and carpets.

●

For outstanding contributions to the knowledge of color in science, art, and industry, *Dorothy Nickerson,* color technologist, Cotton Division, Agricultural Marketing Service, United States Department of Agriculture, Washington, DC, has been selected to be the third recipient of the Godlove Award of the Inter-Society Color Council.

The presentation of the award was made by *G L Erikson,* president of the Inter-Society Color Council, at the banquet held during the 30th Annual Meeting of the Council in Rochester, New York, at the Sheraton Hotel last month. The award is highly unusual in form, consisting of a plastic prism in which is embedded a gold diffraction grating which produces all the colors of the spectrum. The words "Art, Science, and Industry" are engraved on the face of the award. In the center on one side appear the words "The Godlove Award for Contributions to the Knowledge of Color." On the other side appears the name of the recipient, the date of the award, and the name "Inter-Society Color Council."

Miss Nickerson is internationally known for her studies of the color rendering of light sources and for the color standards perfected by her for classing cotton in this country, but used world-wide. She is nationally known for her work on light sources for color grading; for the Nickerson Color Fan, a convenient, systematic collection of 262 color chips used as color standards in horticulture; and for her skillful use of the Munsell color system in the solution of technical color problems.

Miss Nickerson, a past secretary and a past president of the Inter-Society Color Council, is a trustee of the Munsell Color Foundation, and is author of more than 30 papers in various scientific and technical publications.

●

T Vincent Corsini Jr has been named public relations manager of Fabric Research Laboratories, Inc, Dedham, Mass.

He succeeds *Robert N Thurston,* who has resigned to take the position of manager, press relations with Mead Johnson & Co, Evansville, Ind.

E.J.FEELEY
COMPANY
E. J. Feeley Co.
DYESTUFFS · MANUFACTURERS OF TEXTILE CHEMICALS
283 SUMMER ST., BOSTON, MASS. • 1700 WALNUT ST., PHILADELPHIA, PA. • 650 STATE ST., CHARLOTTE, N. C.
Direct Selling Agents in the South of
BASES
STABLE SALTS
(STORED IN TEMPERATURE CONTROLLED VAULTS TO INSURE FRESHNESS)
PHARMANTHRENES
(VAT DYES)
PYRAZOLINES
(FAST DIRECT DYES)
DIPYRAZOS
(DEVELOPED DYES)
COLORS FOR WOOL
PHARMA
Manufactured by
PHARMA CHEMICAL CORPORATION
Plants:
BAYONNE • NEW JERSEY

Mitchell

Davison

Grills

Eccleston

A R Mitchell has been transferred to new chemicals marketing, Union Carbide Chemicals Co, New York, NY. Previously he was a technical representative for the Company in the Philadelphia area.

In his new assignment, Mr Mitchell will be responsible for the market development of acrylate monomers.

●

Robert O Davison has been elected vice president of the Kelco Co. Mr Davison will also continue as manager of the firm's Eastern Division with headquarters at 75 Terminal Avenue, Clark, NJ.

●

Appointment of *Elwood F Booth Jr* as director of research for Solvay Process Div, Allied Chemical Corp, has been announced.

Dr Booth succeeds *Herbert C Wohlers,* who has been transferred to Allied Chemical's National Aniline Division as director of research and development.

Dr Booth has been assistant chief engineer and assistant manager of Solvay's Syracuse, NY, plant, and earlier this year was named an assistant director of research. In his new position, he will continue to be located at Syracuse.

●

Appointment of *J Earl Burrell* as vice president of operations for the chemical division of Pittsburgh Plate Glass Co was announced recently. Mr Burrell had served as general manager of operations since 1958 and previously had been assistant to the vice president, operations.

●

A number of recent executive staff changes, designed to lend greater impetus to its current program in the promotion of wool throughout the nation, have been announced by The Wool Bureau Inc.

Sam Klein has been appointed publicity coordinator for the Bureau, and as such will be directing its publicity and information programs under the executive supervision of *Felix J Colangelo,* secretary-treasurer.

As part of its product development program, *George A Jeandros* had joined the Bureau's Department of Science and Technology, headed by *Gerald Laxer.* Mr Jeandros will work directly with men's suit and trouser manufacturers on the technical aspects of the permanent creasing process for all wool. Prior to joining the Bureau early this year, Mr Jeandros was employed as a colorist by the Eureka Printing Co, Clifton, NJ.

Grace Van Dyke, who joined the Bureau's advertising and promotion staff in 1957, was recently advanced to the post of advertising and promotion coordinator. Under Mr Colangelo's overall direction, Miss Van Dyke will be handling the promotion and advertising projects.

●

Two professors in the School of Textiles at North Carolina State College are authors of a newly published 614-page book, entitled "Handbook for Textile Testing and Quality Control," published by the Interscience Publishers, Inc, New York, NY.

The authors are *Elliott B Grover,* Abel C Lineberger professor of yarn manufacturing and head of the Department of Textile Technology at North Carolina State College, and *Dame Hamby,* Burlington Industries professor of textiles at the college.

Professors Grover and Hamby worked on the book for five years. It sells for $17.50 per copy. The book contains 33 chapters, each of which is devoted to a major topic relating to textile testing and quality control.

Bradford Dyeing Association, USA, has announced the promotion of two ten-year men. *Richard Grills,* presently service manager at the New York office, will move back to Bradford's Westerly, RI operation to assume the responsibilities of production manager.

Eugene C Eccleston, who has been with Bradford's Administrative and Service Departments at the Westerly plant for ten years, will move to New York to become service manager of the New York office.

William E Cruickshank has been elected a director of the company and *Robert O'Brien* has ben appointed to the executive committee. Mr O'Brien is currently a director of the company. In addition, the appointment of *Geoffrey Chamberlain* to the position of purchasing agent for the finishing and dyeing firm has been announced.

Mr O'Brien was recently tapped for general sales manager in charge of the New York office at 111 W 40th St and Mr Cruickshank was named plant manager of the Westerly, RI operation. Mr Cruickshank has been with Bradford for thirty-five years.

●

Leonard Katz, Royal Yarn Dyeing Corp, has taken over the industries' United Jewish Appeal leadership from his father, *Samuel Katz,* who was chairman of the Knitwear and Yarn Division for many years.

●

Jack A Roddy has been named a technical representative for Alliance Chemical Corp in the territory of South Carolina, Georgia, and Alabama.

Mr Roddy was most recently superintendent of dyeing at American & Efird Mills in Mount Holly, NC.

●

Cyanamid International Corp has named *Charles F Bonnet* managing director for general chemicals in continental Europe.

Mr Bonnet will have responsibility for developing sales and coordinating the promotion, sale and servicing of Cyanamid chemicals on the continent and act as liaison officer for Cyanamid subsidiaries and affiliates which produce general chemicals in Europe.

Mr Bonnet formerly was associate regional director, Europe, a position he has filled since June, 1959.

Also announced were appointments of *R T Novotny* as manager, marketing services, general chemicals, Continental Europe, and *L Uytterelst* as manager, finance and administration.

●

The Chlor-Alkali Div of Food Machinery and Chemical Corp has named *William M Clark* sales manager for the southern district with headquarters at Charlotte, NC, and *William D Neese* sales manager for the mid-southern district with headquarters at Cincinnati, O.

Mr Clark joined FMC in 1952 and has served as a salesman in the Charlotte area since then.

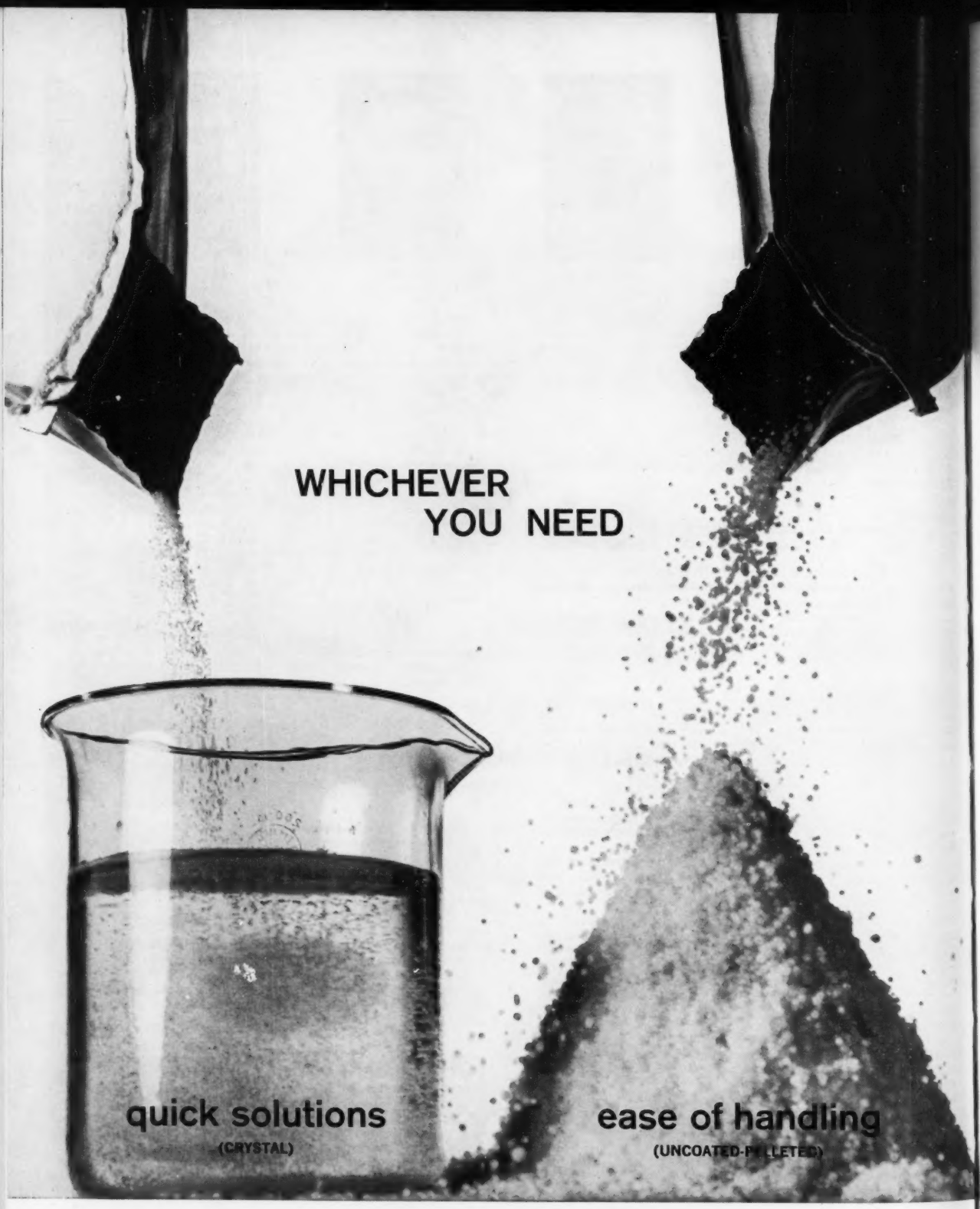
Mr Neese has been with the company as a salesman in the Chicago area since 1957.

●

Marianne Reinke has joined American Cyanamid Co as an advertising and promotion assistant for the Organic Chemicals Division. In her new position, she will be responsible for promoting textile chemical finishes.

Prior to her association with Cyanamid, Miss Reinke had worked in advertising and promotion capacities most recently for General Tire and Rubber Co.

She will be located in the Division's advertising and promotion offices, 111 West 40th St, New York, NY.



order your UREA from Allied Chemical

BASIC TO AMERICA'S PROGRESS

Allied Chemical

NITROGEN DIVISION
Dept. U8-52-2, 40 Rector St., New York 6, N. Y.

The Swelling Action of Carriers in Dyeing Polyethylene Terephthalate Fiber———

(*concluded from page 26*)

case in these experiments, the amount of dye is limited (ie, the fiber is not saturated with dye) and constant, increasing concentrations of carrier decrease the amount of dye on the fiber in the equilibrium state; that is, partitioning of the dye is shifted in favor of the bath. This is illustrated for the case of o-phenylphenol in Figure 9 (*8*). The upper curve represents equilibrium dyeing; at low concentrations, long dyeing times are required, whereas at high concentrations equilibrium is reached after as little time as two hours. The exhaustion curve for a two-hour dyeing period passes through a maximum: equilibrium is attained to the right of the maximum, but not to the left.

It is clear from Figure 9 that exhaustion may pass through a maximum when plotted as a function of the amount of contraction. The upper plot in Figure 8, for any given carrier, may therefore exhibit a maximum, and if it does, the maximum will be located near that contraction where the concentration of carrier is great enough to ensure that equilibrium is closely approached after 60 minutes. Exhaustion data from experiments where equilibrium was reached are therefore misleading and are not shown in Figure 8.

It is clear from Figure 8 that swelling does enhance the dyeing rate. The effect is not very large, however, compared with that of the other important factor that is involved, namely, mobility of the polymer chain. The equation of a least means square plot through the exhaustion data obtained in absence of carrier is

$$D = 8.16 + 1.41C$$

where D is percent dye exhaustion and C is percent contraction. Thus assuming the effect of swelling can be isolated from other effects of the carrier, a contraction of one percent increases dye exhaustion by 1.4 percent under the stated conditions of dyeing.

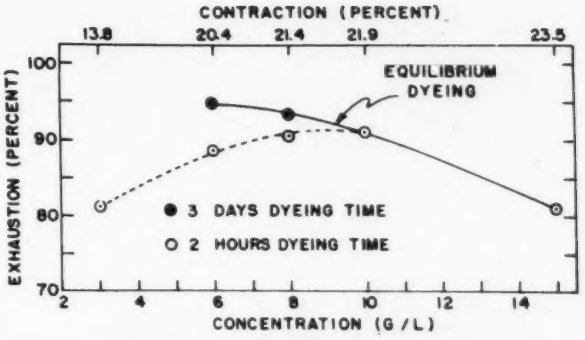


Figure 9

Exhaustion of dye as a function of initial concentration of o-phenylphenol; polyethylene terephthalate yarn dyed at 98°C.

SUMMARY

Water-insoluble carriers shrink polyethylene terephthalate fiber more than water-soluble carriers; the former group is known to be more effective on a weight basis as dyeing assistants. Agents absorbed by the fiber in small quantities do not swell the fiber and are ineffective dyeing assistants.

The swelling of the fiber produces changes in its mechanical properties consistent with those expected on partial deorientation of the fiber. It was actually shown by X-ray diffraction that, in the case of fiber treated with 1% o-phenylphenol, significant deorientation had occurred.

The swelling of the fiber produced by carriers evidently persists to some degree even after the carrier is removed, with the result that the dyeing rate on the treated and extracted fiber is increased above that of the untreated fiber. The effect is relatively small, however, compared with the total effect in the presence of carrier.

The essential function of the absorbed carrier apparently is to reduce the attractive forces between polymer molecules. The polymer molecules then have greater freedom of motion, and the extended long-chain molecules contract to the less-ordered state of the swollen fiber. The greater mobility of the chains allows a much faster rate of diffusion of dye through the fiber than would be the case in the absence of carrier, but superimposed upon this may be a smaller increase that is the result of the larger volume made available by swelling of the fiber.

ACKNOWLEDGMENT

We wish to thank Dr L T Cleary of the Dacron Research Laboratory, E I duPont de Nemours and Co, Inc, for X-ray diffraction patterns of certain samples of treated Dacron fiber.

LITERATURE CITED

(1) Salvin, V S, et al, *Am Dyestuff Reptr 48*, 23 (1959).
(2) Schuler, M J, *Textile Research J 27*, 352 (1957).
(3) Choquette, P J, *ibid 24*, 387 (1954).
(4) Waters, E, *J Soc Dyers Col 66*, 609 (1950).
(5) Brown, A, *Textile Research J 25*, 891 (1955).
(6) Glenz, O, Beckmann, W, and Wunder, W, *J Soc Dyers Col 75*, 141 (1959).
(7) Cleary, L T, private communication.
(8) Kapashi, S S, unpublished thesis, North Carolina State College.

TRADEMARKS

The following registered trademarks have been used in this paper:

Dacron—E I du Pont de Nemours & Co, Inc
Latyl—E I du Pont de Nemours & Co, Inc
Triton—Rohm & Haas Co
Emulphor—General Aniline & Film Corp

GENERAL CALENDAR OF COMING EVENTS

ACHEMA
June 9-17 (13th International Chemical Engineering Exposition and Congress———Frankfurt am Main, Germany)

AMERICAN HOME ECONOMICS ASSOCIATION
June 27-30 (52nd Annual Meeting———Cleveland, Ohio)

CHICAGO SECTION, AMERICAN CHEMICAL SOCIETY
Sept 5-8 (11th National Chemical Exposition———Chicago Amphitheatre, Chicago, Ill)

INTERNATIONAL TEXTILE MACHINERY EXPOSITION
Sept 1962 (3rd Exposition, Hanover, Germany)

NATIONAL COTTON COUNCIL OF AMERICA
Nov 8-9 (1961 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC); Oct 3-4, 1962 (1962 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC)

SCHWEIZERISCHER VEREIN DER CHEMIKER-COLORISTEN
October 12-14 (Symposium on "Permanent Finishing 1961"——— Swiss Federal Institute of Technology, Zurich, Switzerland)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
May 22-24 (Spring Outing———Skytop Lodge, Skytop, Pa); June 15, Sept 12, Oct 10, Nov 14 (Luncheon Meetings———Palm Terrace Suite, Hotel Roosevelt, New York, NY); Dec 7 (Annual Meeting and Dinner———Hotel Roosevelt, New York, NY)

UNION OF PURE AND APPLIED CHEMISTRY
August 6-12 (18th International Congress of Pure and Applied Chemistry———Montreal, Canada)

WORLD CONGRESS FOR MAN-MADE FIBERS
May 15-18, 1962 (2nd World Congress, London, England)

PENETRANTS • DETERGENTS • SOFTENERS • REPELLENTS • FINISHES

BURK-SCHIER

BURKART-SCHIER CHEMICAL CO., CHATTANOOGA, TENN.

CLASSIFIED ADVERTISEMENTS

Advertisements in this section are restricted to HELP WANTED — POSITION WANTED — EQUIPMENT wanted or for sale. Rates, effective February 1, 1951; One-time, $14.00 per column inch; 13 or more times, $12.00 per column inch: Position Wanted, $4.00 per column inch. Figure 38 average words per column inch. Publisher reserves the right to reject or discontinue any classified advertisement. Replies should be addressed: Box Number ..... c/o American Dyestuff Reporter, 44 East 23rd Street, New York 10, N. Y.

• SERVICES •

ABSTRACTING SERVICES—Abstracting and digesting of foreign patents and periodicals. Literature review and special reports in dyestuff and cellulose chemistry.
PAUL WENGRAF, 88-36 ELMHURST AVENUE, ELMHURST 73, NEW YORK

TEXTILE JOBS OUR SPECIALTY
Over 55 Years in Business
THE POSITION YOU WANT may be available right now. The demand for executives is increasing. Salaries are attractive. You are invited to send us your resume in confidence.
CHARLES P. RAYMOND SERVICE, INC.
Phone: LIberty 2-6547
294 Washington St. Boston 8, Mass.

• OPPORTUNITIES AVAILABLE •

CAREER OPPORTUNITY—for recent textile school or textile chemistry graduate age 21-24. The man we are looking for should have a friendly, outgoing personality and be interested in the idea of a sales career—even though he may not be heading in that direction now. Thorough training program, good salary and benefits, excellent growth possibilities—New York area. Replies held in strictest confidence. Our employees know of this advertisement. Write Box No. 141

OPPORTUNITIES at FMC's Newly Enlarged Chemical Research and Development Center, Princeton, New Jersey in TEXTILES APPLICATIONS RESEARCH. Chemists with 1 to 6 years experience in the textile or textile chemicals industry to work on applications and technical service problems involving a wide variety of chemicals. These responsible positions in our Inorganic Research and Development Department offer excellent opportunities for growth. Arrange for an interview by submitting a resume, including salary requirements to: Mr. W. J. Paquette, FOOD MACHINERY & CHEMICAL CORP., P. O. Box #8, Princeton, N. J.

WANTED: CHEMIST FOR TEXTILE CHEMICAL SPECIALTY MANUFACTURER. Must have experience in analysis and development. Excellent opportunity with progressive company. Salary commensurate with experience and ability. Write Box No. 154

WANTED: SALESMAN to represent Eastern Color and Chemical Company in Southern Territory. Men must be aggressive with a sincere desire and ability to sell. Excellent opportunity with liberal compensation for right man. Send brief resume of your background, which will be held in strict confidence, to sales manager at above company at 35 Livingston Street, Providence, Rhode Island.

WANTED: TEXTILE DEVELOPMENT CHEMIST—Opportunity to head textile development group of national chemical company. Require 5-10 years experience in textile field—background in polymer chemistry desirable. Central New Jersey labs. Write education, experience in detail. Write Box No. 155

• PERSONNEL AVAILABLE •

POSITION WANTED: TEXTILE CHEMIST OR COLORIST. B. S. Textile chemistry and dyeing—36 years of age, single. 10 years experience dyeing and printing (roller and screen). Desire position as textile chemist or colorist. Excellent references. Write Box No. 142

POSITION WANTED: The services are available of a practical dyer specializing in wool and wool blends. Over twenty years experience in a technical capacity with extensive laboratory and technical service experience. Would prefer to locate in Virginia. Write Box No. 151